# PHOTOGRAPHIC PASTIMES:

A SERIES OF INTERESTING EXPERIMENTS FOR AMATEURS FOR OBTAINING NOVEL AND CURIOUS EFFECTS WITH THE AID OF THE CAMERA.

BY

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*(Translated from the Second German Edition.)*


LONDON:
ILIFFE & SON, 3, ST. BRIDE STREET, E.C.
1891.

ILIFFE AND SON,
3, ST. BRIDE STREET, LONDON E.C.
AND COVENTRY

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## SPECIALITIES.

# PHOTOGRAPHIC PASTIMES.

## CHAPTER I.

### FLORAL PHOTOGRAPHY.

Flowers, so beautiful and varied by themselves, and capable of such variety of lovely combinations, form charming subjects for photographic treatment. Very much depends thereby on the efficient illumination and arrangement.

Flowers of light tones should be provided with a dark background, whilst those of darker colours should be arranged so that they are placed in front of the lighter coloured ones, in order to give them proper relief. The inability of the ordinary gelatine plates to represent yellows and blues and reds in true relation, is not a very serious obstacle to the successful photography of flowers.

Nature is so lavish in her largess of gradations of the same colour, that one has ample scope for selecting such tint as shall give in the photograph any desired shade. That is to say, a certain shade of yellow or red, which to the eye is accounted a light shade of that particular colour, will, when photographed, give a most agreeable deep grey, corresponding to what is normally a darker shade of the colour. The photographic tones are much lower than in nature, but it is just for this reason that they are suited for the deeper half shadows or the deepest shadows. These tones are not what they actually are, but just what we want them to be. Experience teaches what shade a colour will take when photographed, which will vary with the amount of light to which it is exposed.

The first thing to consider is the proper massing of the lights and shades. Any

arrangement which gives an alternation of light and dark flowers is unpleasant; the bouquet has a spotty appearance, and is without the proper relief. The grouping should always be so managed that the bouquet is divided diagonally into two main divisions of principal light and shade, the transition into each being gradual, the dark blending into the light, the light into the dark. A good way to secure this massing of lights and shadows is to make use of the foliage for the shadows. There is an infinite variety of shades in the green of leaves, so that the gradations, if studied with the photographic eye, which here is much superior to the orthochromatic film, are very easy to secure. (1.)

A good way to arrange flowers which are to be photographed consists in fixing the camera vertically, and placing the flowers on a suitable background on the floor. Of course a studio affords every

facility for efficient illumination, but in fine, still weather, it can be easily managed in the shade out of doors. A spot should be selected where a trifle more shadow can be cast on one side, or the picture will be flat. A raised camera stand is necessary, and the camera is attached lens downwards, so that it points down at the flowers on the floor. A high pair of studio steps can be used, with the lens pointing down through a hole cut in the top for the purpose.

An efficient background can also be made by painting cardboard or wood with grey oil paint, and, while still wet, sifting over it some silver sand. A solution of pale glue, to which one per cent. of glycerine and a little whitening have been added, will answer even better. When dry, the superfluous sand is lightly dusted off, and the flowers are grouped upon it.

Preference is to be given to slow

rather than to rapid plates, and the symmetrical form of lens with a focal length of from ten to twelve inches, and an aperture of about $\frac{f}{10}$ to $\frac{f}{15}$, will prove all that can be desired. In the majority of cases vignetted prints will prove the most satisfactory. (2.)

## PHOTOGRAPHING ANIMALS.

As in the case of animal photography very often rapid movements are to be fixed by the camera, a first-class rapid lens of sufficiently long focal length (seven to eight inches at least) should be used. If it is possible to previously determine the place where the exposures are to be made, it is well to set up a suitable background in a proper position, corresponding, of course, as regards colour with the objects to be photographed. Thus, for instance, a white sheet should not be hung up if a white cat or goat is to be taken, nor a dark-coloured material if

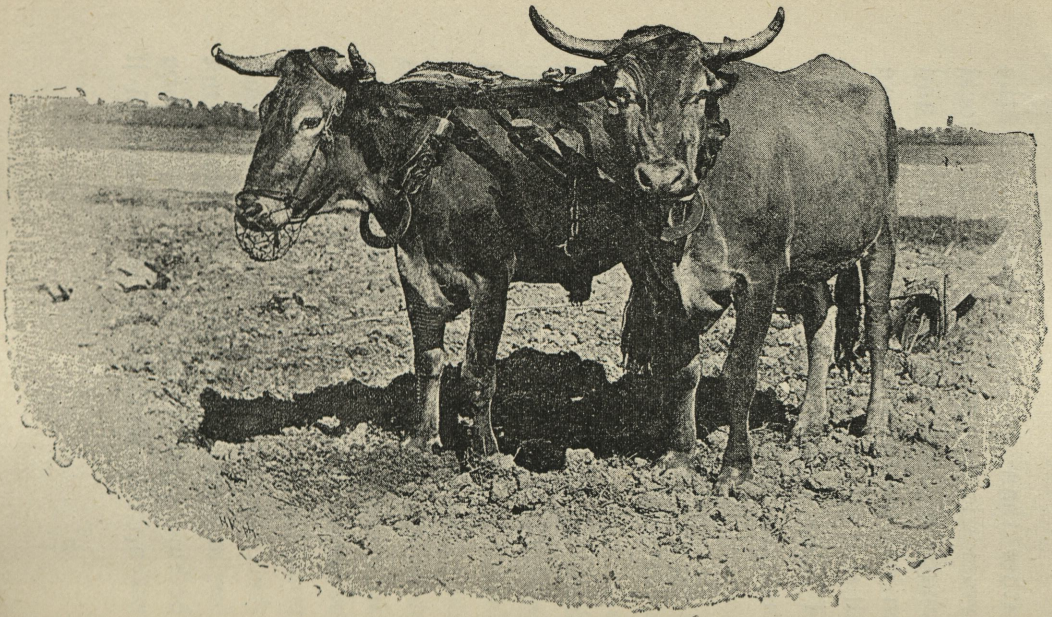


FIG. 1.—ANIMAL STUDY.

*Photographed by Mr. A. Stieglitz, with Aplanatic lens of 19 lines diameter, fifth stop, and one-fifth second exposure.*

dark-coloured animals are to appear before it. This applies also to the ground over which the animal moves. Besides, the background should be of sufficient size to cover the whole plate, and not leave an end or side vacant. Especially if the animals are small, the background should come down fully to the ground, otherwise there will always be an unsightly space just in the rear of the lower legs. In order to ensure accurate focussing, the moving subject should arrive at a point which has previously been determined and focussed upon.

As full sunlight will have to be used in order to obtain sufficient rapidity, great attention must be paid to the shadows, which very often are thrown heavily upon the background or on the ground, or both, and are more prominent than anything else in the picture. If this defect cannot be prevented, a good deal may be

done on the finished negative by retouching.

White or light-coloured animals can, of course, be more easily photographed than dark-brown or black ones, as can also those whose natural movements are not particularly rapid. Among domestic animals, excellent results may be obtained with dogs of almost all kinds, cats, rabbits, pigs, goats, donkeys, oxen, horses and calves. Tame water-fowl of every variety may also be taken either singly or in groups. Some of the most beautiful pictures of this class will be given by large white swans on water, if care be taken not to have the camera too high, so that the perspective in the photograph shows the surface of the water as if standing at an angle of forty-five degrees, and the white figure of the swan cut out and stuck upon it. (3.)

The pretty portrait of the intelligent cat which we reproduce here, as well

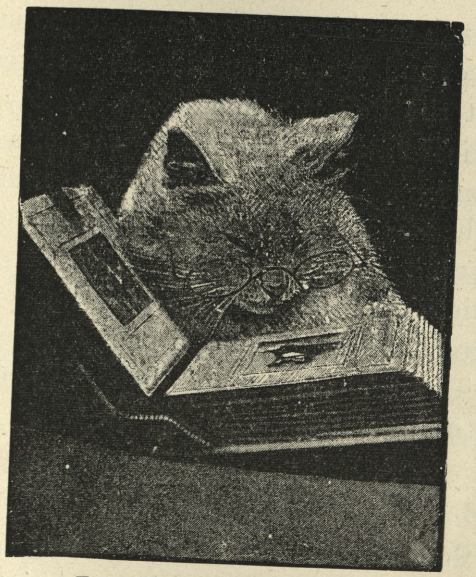


FIG. 2.—PORTRAIT OF A CAT.

*By M. Pointer, of Brighton.*

as the group of oxen, taken by Mr. Alf. Stieglitz during his trip to Italy, which is reproduced on page 14, show what excellent results may be obtained by patient and skilled operators in photographing domestic animals.

When photographing dogs, always ap-

proach a strange one as an old acquaintance, and you will seldom find it resist. Let the dog run about, and satisfy his curiosity by getting familiar with his new quarters. Never force him into position, or he will look sulky and suspicious. To secure his attention, imitate a dog whining, or the buzzing of a bee. To attract the attention of a pack of hounds, imitate the huntsman's horn, when the entire pack will remain motionless. (4.)

### PHOTOGRAPHING SNOW SCENES.

Snow and rime scenes, if properly treated, afford very beautiful and pictorial photographs. There, are, however, certain conditions necessary under which these fairy scenes of the inverted year can be caught in all their beauty. Much depends on exposure, much more on development. A snow or ice scene is only effective when the contrasts are properly balanced; the great danger of harshness arises from

the high lights being so brilliant, and the shadows so deep cast. This is especially the case when the sun illuminates the masses. The proper angle of illumination must be selected, so that the prominent portions cast shadows upon the level parts of the snow or ice. A slightly overcast day, for this reason, yields much better results ; the light from the snow clouds in the sky is really dazzling, as anyone can prove by looking steadily at one for a few minutes.

Slow plates with thickly-coated films are to be preferred to rapid ones. The time of exposure, of course, depends on the degree of the sensitiveness of the plate, and on the condition of the light. Slight over-timing is preferable to under-timing, as we can, in a measure, remedy too strong an action of light, whilst there is no photographic therapeutic for insufficient exposures. A direct rule for exposure cannot be given, inasmuch as

even snow scenes vary much in variety and character.

A strong, vigorous development never gives as good results with snow scenes as a soft, slow action of the chemicals. The alkali should be in slight excess, so as to keep down violent contrasts, and the quantity of water increased at once if the action is found to proceed too rapidly. By this means the shadows have an opportunity of accumulating some of the particles, and are consequently made richer thereby in detail. However, flatness must be avoided, and judgment must be called constantly into exercise if one is anxious to secure beautiful results. The negative should be frequently looked through, to see if the high lights have the necessary vigour. If the shadows have built up, then add a little more pyro if the high lights are tardy in gaining strength.

Snow and ice scenes are with advan-

tage printed on aristotype paper, which renders the detail far better than albumen paper. (5.)

## PHOTOGRAPHING WATER.

Water in motion taken instantaneously suffers very much from the defect of too much hardness. An instantaneous photograph of a rapid in a river generally looks as if the whole had been turned to ice. This is due to the eye being unable to see an object moving at more than a certain rate, *i.e.*, about $\frac{1}{10}$ second. Therefore, in order to photograph running water as we see it, an exposure of $\frac{1}{5}$ to $\frac{1}{10}$ of a second should be given. The water then comes out with pleasing softness, and yet there is not the mere blur, which is generally the result of longer exposures, such as over a second. Exposures of such duration can easily be given with the cap and without any shutter. (6.)

## PHOTOGRAPHING GLASS WARE AND METAL VASES.

In order to prevent the injurious reflections and high lights in photographing glass ware, the light should shine *through* the subject instead of on it. To be able to do this, there must be constructed a large frame like the three sides of a box, the fourth side being strengthened by two cross strips of wood. The arrangement will now look like a box with one side and the top and bottom missing. This is set against the window of the room, and at the back of it—that part which is next to the light—a sheet of ground glass is fixed. On the inside of the frame and against the ground glass is arranged a narrow shelf, on which the glass ware to be photographed is placed. Should the room in which the photograph is to be taken possess more than one window, then all others should be covered by blinds, so that the only light

admitted comes through the ground glass and the glass ware. The camera is then put directly facing the light. The ground glass forms a beautifully soft background, and the negative will show clear outlines, whilst the high lights will be conspicuous by their absence. A very little practice will discover the correct exposure, which is necessarily short.

Also silver and tin vases, or any kind of polished metal, generally possess very strong reflections, so that in the picture the form is often rendered uncertain by them. One plan, which answers very well for small cups or vases, is to place a piece of ice in the inside of the vessel. The cold inside condenses vapour on the surface and makes it dull. In cases where a salver or a candelabra, etc., is to be photographed, the easiest and best plan is to take a piece of soft putty and stipple the article all over, or, if it is a flat surface, roll the putty on. This will

give a beautifully smooth matt surface, with no reflections. The article may be placed in the most favourable light during the exposure, and the putty easily rubbed off afterwards, and it will not injure the most highly polished piece of plate. (7.)

## COPYING OIL PAINTINGS.

The copying of oil paintings in their relative colour scale, especially such as are much darkened by age, is out of the question with ordinary gelatine plates, owing to the yellow, orange, and red colours, which in paintings appear bright lights to the eye, becoming shadows in the photograph, while the blues and violets of paintings, which in reality appear dark to the eye, are reproduced as middle-tints, or even high lights, in the photograph. As it is absolutely necessary in photographing oil paintings to have the colours relatively correct, orthochromatic or colour-sensitive plates should be

employed. With these plates the exposure is made with a yellow screen placed behind or before the lens, varying in depth of colour in accordance with the intensity of those in the original to be copied. The yellow light of petroleum and gas may be employed for the reproduction of paintings, which is advantageous for amateurs who have most leisure for work in photography in the evening; besides, the originals may with much more ease be evenly illuminated by artificial light. The time of exposure, owing to the sensitiveness of the plates, is not much increased. (8.)

New oil paintings are covered, in the first instance, with a coating of albumen* as evenly as possible. The albumen must have been well beaten up previously to its application. Old and partly-faded paintings are brushed over with glycerine by means of a soft sponge.†

* The commercial "French varnish," which may be diluted as required by spirit, answers better.

† Instead of glycerine, petroleum may be used with advantage for equalising the gloss of the painting.—*The Author.*

If the exposure is made in the open air, the picture should be enclosed by screens of a suitable height, made of a black material, so as to prevent all chance of reflected light, as shown at *S* in fig. 3. In the framework opposite

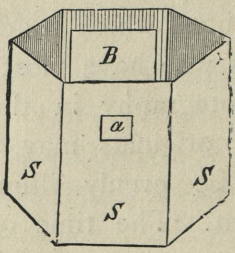



FIG. 3.—ARRANGEMENT FOR COPYING OIL PAINTINGS.

the picture is an opening (*a*), through which the lens is placed. Pictures with a very light sky are placed bending forwards opposite the instrument, or are turned round with the sky downwards.

In copying a painting at night, by artificial light, as mentioned above, the yellow screen may be dispensed with. It

is only necessary in cases where there is a great preponderance of ultramarine in the colouring, and even then it need be only of a light yellow tint. (9.)

## TO PHOTOGRAPH FROST PICTURES.

To procure frost pictures, Mr. A. Donald gives the following instructions: Coat a plate with collodion, immerse it in water, until all greasy lines have disappeared, drain for a little, then place (in winter) in the open air. If the frost be keen, in less than a quarter of an hour a delicate and beautiful frozen image will have formed itself on the collodionised plate. Set the frozen plate before a board covered with black velvet, and by means of a slow and thickly coated (or backed) plate take a negative. The result will be a permanent record of Jack Frost. If a trace of a soluble salt were added to the water in which the collodion plate is in the first place immersed, there

would probably be produced an unlimited variety of forms. (10.)

### CRYSTALLISATION PICTURES.

To complete the experiment with frost pictures described above, I recommend the following interesting methods :

If a hot saturated solution of acetate of lead, to which some glue or gelatine has been added, is by means of a brush applied to a glass plate, the salt, in cooling down, will crystallise out in the form of beautiful shining crystals. In using other salts, other figures are obtained, such, for instance, as tree-like ramified forms by means of sulphate of zinc, and a sort of a complication of ostrich feathers by means of sulphate of iron, etc. The figures obtained may be etched into the glass by the use of fluoric acid. The glass plates covered with these crystals give, by reflected light as well as by transmitted light, very nice

photographs, and especially stereoscopic pictures, which, on account of their silk-like gloss, show almost magical effects.

## PHOTOGRAPHS OF LIGHTNING.

Outside photographic circles it is often supposed that taking photographs of lightning, the quickness of which is proverbial, is attempting very great difficulties. In reality, however, these photographs can be produced in the simplest manner, at night, of course. Any camera may be used for the purpose, which should be in focus for distant objects (the horizon), and provided with a lens of as wide an angle as possible to include a wide expanse of sky. It should work with full aperture, or about $\frac{f}{10}$. The camera is pointed to the direction of the sky where the thunderstorm approaches, and the cap of the lens may be left off during the whole performance. Rapid plates should be used, but negative paper is

to be preferred to gelatine plates, as it effectually prevents reflection from the back. A flash that has not been in the

FIG 4.—PHOTOGRAPH OF LIGHTNING.

field of view will not fog the plate by diffused light, but I have observed that this may be caused in some cases, if the lens has been uncovered for a rather long time, by the almost continual lightning which often takes place between the real flashes of lightning. It is therefore better to keep each flash separate, and to use

any arrangement by which the plates may be easily and quickly changed. (11.)

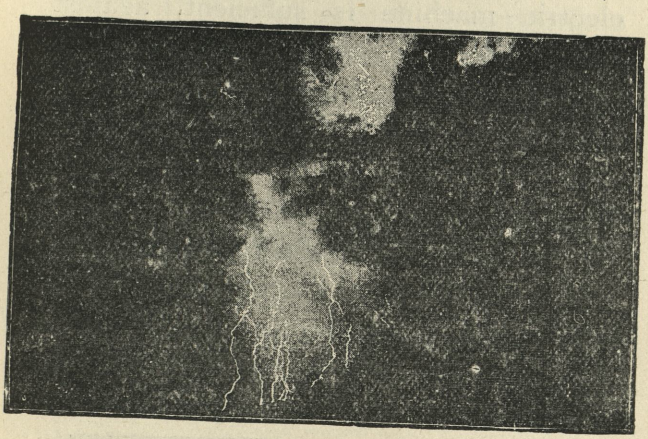


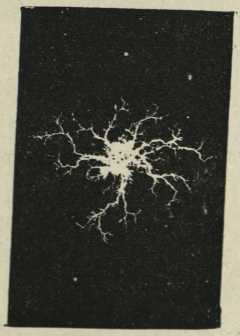
FIG. 5.—PHOTOGRAPH OF LIGHTNING.

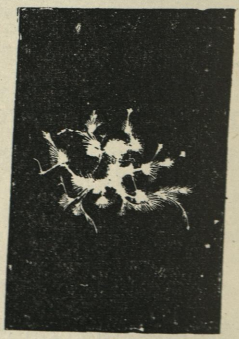
To develop the negatives the sulpho-pyrogallic acid developer is very suitable, but I have also got good results with eikonogen, or the combined eikonogen and hydroquinone developer.

## OTHER ELECTRIC PHENOMENA.

Interesting photographs are those of the electric spark, which the latter pro-

duces itself on the sensitive plate. For this experiment an ordinary friction electric machine is sufficient, against the conductor of which a gelatine plate is kept (in the dark) with the moistened hand so that it finds itself at a slight distance vertically from it. On turning the machine fine sparks are emitted on the sensitive film, which, on development, will give very characteristic, palm-branch-like, ramified and curved figures. The sparks emitted by the negative conductor show, however, figures of an





FIGS. 6 AND 7.—THE ELECTRIC SPARK.
POSITIVE POLE. NEGATIVE POLE.

entirely different character from those emitted by the positive pole. (See figs. 6 and 7.) According to the investigations made hitherto this phenomenon seems to depend not so much on a chemical decomposition as on a direct electrolytical action. (12.)

Instead of letting the electric spark reproduce for itself, it can as well be photographed by means of the camera and the lens. For this purpose it is necessary to previously focus the spot where the electric spark passes from the one conductor to the other, which may be done by means of a luminous subject (for instance, with a platinum wire made incandescent by the electric current), which should be placed in the middle of the ideal line which combines the two conductors. After focussing, this subject is removed, the room darkened, the lens uncovered, and, after withdrawing the sliding door, the electric machine

is put into action. The figures obtained in this way are different, with regard to their form, from those described above. (13.)

Experiments which may be made by means of electricity in the reproduction on a photographic plate of opaque subjects, for instance, coins, seals, etc., may be also mentioned here. Two pieces of money are laid in a darkened room, side by side, at some distance from each other, on a gelatine plate lying film side uppermost on a table, and a current is passed through; if then the plate is developed, it will show, besides the picture of the electric spark, also a reproduction of the pieces of money, in which the parts corresponding to the relief of the coin are represented as shadows, the parts corresponding to the depths as lights.

This experiment may be successfully executed in the following manner: On a small board a tin plate is fixed, which

then forms the conductor; a gelatine plate, film side uppermost, which then forms the isolator, is laid upon it, and finally upon the sensitive film a seal is placed, forming the other conductor. If now by means of a suitable machine this

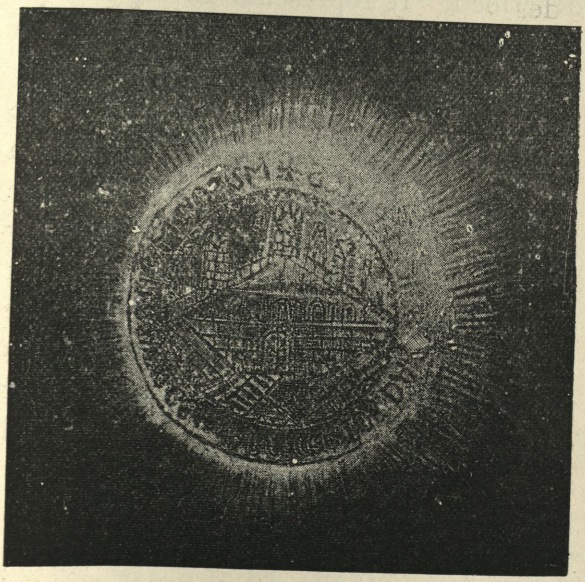


FIG. 8.—REPRODUCTION OF A SEAL PRODUCED BY ELECTRICITY.

kind of condenser is charged, and the electrical spark allowed to pass, a pretty distinct and sharp reproduction of the seal is obtained on the plate.

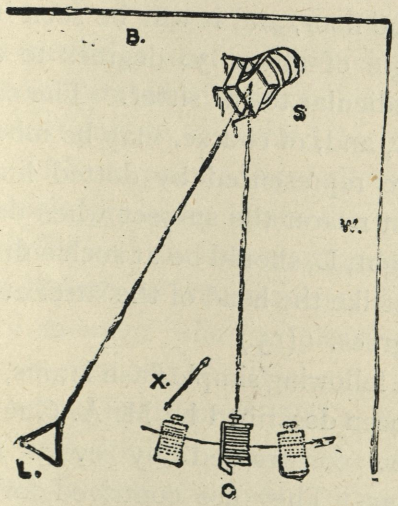
Fig. 8 shows an illustration which has been produced by the method above described. It represents an old seal of the town of Padua, the details of which are reproduced exactly. (14.)

Undoubtedly the sunlight is one of the most important supports upon which photography is based, but even of this we have been made independent of late by the continuous advancement of the art of photography, so that it is now possible to take photographs, even instantaneous photographs, by an artifical illuminant capable of being commanded and directed at will, many hours after the earth's luminary has ceased to shine for the day. This is of special value to the amateur who during the daytime is fully engaged by his business, and it is therefore not to

be wondered at that

MAGNESIUM FLASH-LIGHT PHOTOGRAPHY

has found a large section of adherents and admirers, so much the less, as this branch of photography has a very broad scope for its application. We may first describe in what manner the artistic method of illuminating the subject is carried out best in using flash-light for portraiture.




FIG, 9.—ARRANGEMENT OF THE APPARATUS FOR USING THE FLASHLIGHT.

B (fig. 9) represents the background. The sitter, S, is placed at any desired distance from it. The further removed the less shadow will be thrown upon it. W is a long, grey side wall, L the position occupied by the illuminator used to study the lighting of the face, and also the place occupied by the powder. X is a screen to prevent any rays of light from entering the lens. L should be at least seven feet from the floor, and it will be seen it is at an angle of about 30 degrees to a line perpendicular to the sitter. The camera is at C, and, of course, may be moved in the arc represented by dotted lines, or brought nearer the subject when desired. The light, L, should be at such a distance as to strike the head of the sitter at about 30 degrees. (15.)

The following simple flash lamps, which have been described by M. A. Guébhard, can be constructed by every skilled amateur. They are contrived for blow-

ing the pure magnesium powder (flash powder) upwards into the flame of an ordinary candle, or in two cases into a spirit flame.

The first instrument, which is illustrated in No. 1 (fig. 10), consists of a simple S-shaped glass tube of about one-third of an inch diameter, being fastened at one of its curves on a block of lead, and the vertical end of which is provided with a kind of copper pipe-head (a perforated cartridge shell), in which a pad of cotton saturated with alcohol is placed. The other end is connected by rubber tubing with a pneumatic ball, which, by a gentle pressure, blows the magnesium powder into the flame, automatically igniting it with an instantaneous flash at the very moment when a pleasing expression is seen on the sitter.

The second instrument (No. 2, fig. 10) consists of a straight glass tube of six inches length, and of one-fifth of an inch

diameter, in the centre of which a small funnel is inserted, serving for the reception of the magnesium powder, and which can be closed by a stopper. At one end of the tube a rubber tube is fastened; at the other end a small, straight, oblong-shaped spirit lamp is fixed by means of a bent iron wire, which lamp is formed by a copper channel of two inches length and one-fourth of an inch width, containing beneath a fine metal grating a pad of cotton wool saturated with spirit.

Though these instruments are very simple and easy, they have notwithstanding the drawback that, in using them, an additiona candle or lamp must be employed for focussing, because the light emanated by the spirit flame is too dull for this purpose. Owing to this fact it is, however, very likely, though the focussing may be accelerated as much as possible, that during the time which elapses in focussing the sitter will lose his expres-

sion or arrangement. On the other hand, the flame of an ordinary candle, which at the same time serves for focussing, being quite sufficient to ignite the powder, it is only necessary


FIG. 10.—INSTRUMENTS TO IGNITE THE FLASH POWDER.

to have a glass tube of about four inches length and $\frac{1}{6}$th of an inch diameter, which may be bent over a Bunsen burner or simply over a spirit flame to the shape of

a small hunting horn, as it is sketched in Nos. 3 and 4 (fig. 10). After some experience, and if one has a flame of three to four inches length at his disposal, it will be possible to bend half a dozen of these small tubes within half an hour. It is then only necessary to widen the one end of the bent tube to the shape of a trumpet mouth, and to mould the other end pear-shaped, the former, in order to introduce by means of a funnel, made of glazed paper or of glass, the magnesium powder into the tube; the latter to provide a fastening for the rubber tubing with the pneumatic ball. Before taking the photograph the glass tube is put on the thumb or on the forefinger of the hand like a ring, and the burning candle taken with the same hand (Nos. 3 and 4, fig. 10), inclining the mouth of the tube as boldly as possible from the base to the point of the flame, and pressing at the given moment with the

other hand gently on the pneumatic ball.

About twenty centigrammes of magnesium powder are sufficient to produce a sufficiently powerful illumination at ten feet distance from the subject, and in using a small camera of the kind illustrated in fig. 11.

The finer the magnesium powder has been pulverised, the quicker is the flash it produces. But the rapidity of the flashlight may be increased also by distributing the required quantity of the powder into several tubes. By this arrangement a number of illuminants of any adjustment and intensity can be simultaneously put into action from some distance, which, from an artistic point of view, is a great advantage, inasmuch as harsh shadows and exaggerated contrasts between lights and shades can thereby be entirely avoided. For this purpose it is only necessary to construct the pneumatic arrangement so as to have one

pneumatic ball, which, by means of sufficiently long and suitably branched indiarubber tubings connected by metal T-pieces acts on any desired number of bent glass tubes. In this case the glass tubes may be fastened in different ways. Without altering their original hunting-horn-like shape, it is sufficient to draw a small piece of india-rubber tubing over it, and to connect it by means of a copper wire, joined to it, with a brass clamp or a pair of sugar-tongs, which can be fixed to the candle (No. 6, fig. 10); or simply to fasten it to the candle by means of a spirally bent stout iron wire (No. 5, fig. 10). But the wire may be entirely omitted by modifying the shape of the tube as it is sketched in No. 8 (fig. 10), namely, by lengthening the widened end of the glass tube and bending it so that it is blowing the magnesium powder from below upwards through the flame; or the bent tube

may be vertically fastened to the candle by the aid of indiarubber bands or threads. If one has acquired sufficient experience in glass-bending to be able to produce it, the most convenient shape of tube is the one illustrated by No. 7 (fig. 10). Here the plain end is bent twice, at first vertically to the plane of the tube, then obliquely to its axis, so that a ring is formed, which may be covered with indiarubber and eventually supported by small wedges, and which consequently can be always fastened to the candle very firmly and stripped off at will. Finally, in No. 9 (fig. 10), an instrument is sketched, in the production of which the glass work has been reduced to its simplest form, where the glass tube is bent at the top in order to blow out the powder, and at the bottom in order to receive the required supply of powder. This primitive instrument is, however, far less appropriate for this purpose than the other spirally bent

tubes, or "photospires," as they are called by M. A. Guébhard.

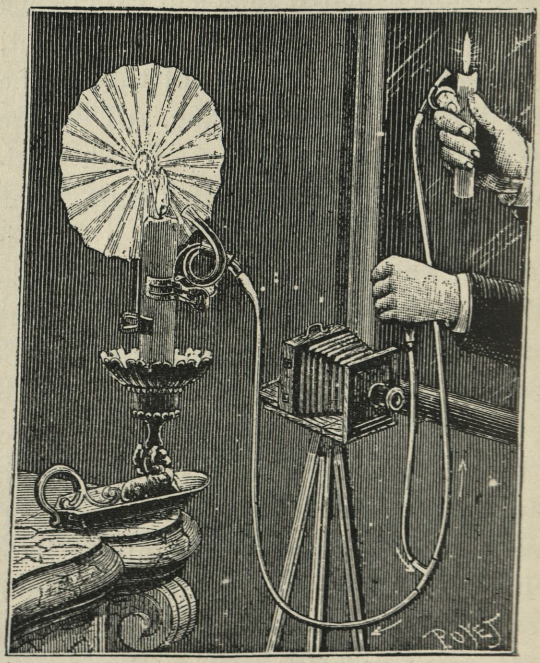



FIG. 11.—ARRANGEMENT OF THE APPARATUS.

In fig. 11 the arrangement of the complete apparatus for flash-light photo-

graphy is illustrated; two illuminants are used, which are practically always sufficient, especially if one possesses a reflector, which of itself considerably reduces the harsh effect of a single illuminant.

## PICTURES BY MOONLIGHT.

Owing to the exceeding sensitiveness of our modern gelatine plates, photographs may also be taken by bright moonlight. The exposure must of course be comparatively very long, since the photographic value of the lunar radiation is to that of a dull winter day only as 1 : 6000. The lens may be left uncovered for about one hour, a slight overexposure being of little consequence. If at the time of the exposure the ground is covered with snow, the exposure may be reduced to about 40 minutes, in consequence of the masses of light which the snow reflects into the camera. A rapid

lens with full aperture and a highly sensitive plate should be used. If the moon itself is included in the picture, its track will make a straight band of light nearly half way across the photograph, which, besides the peculiar illumination of the landscape, gives a most characteristic effect.

### PYROTECHNICAL PHOTOGRAPHY.

Quite interesting photographs can also be taken at night of pieces of fireworks. The pictures are taken by the above described simple method that is used for photographing a flash of lightning. The camera is merely aimed toward the point where the discharge will take place, which should be focussed previously by aid of any light burning at the place, and the lens left open until it has occurred. Also here the largest possible aperture, a rapid lens and a rapid gelatine plate should be used.

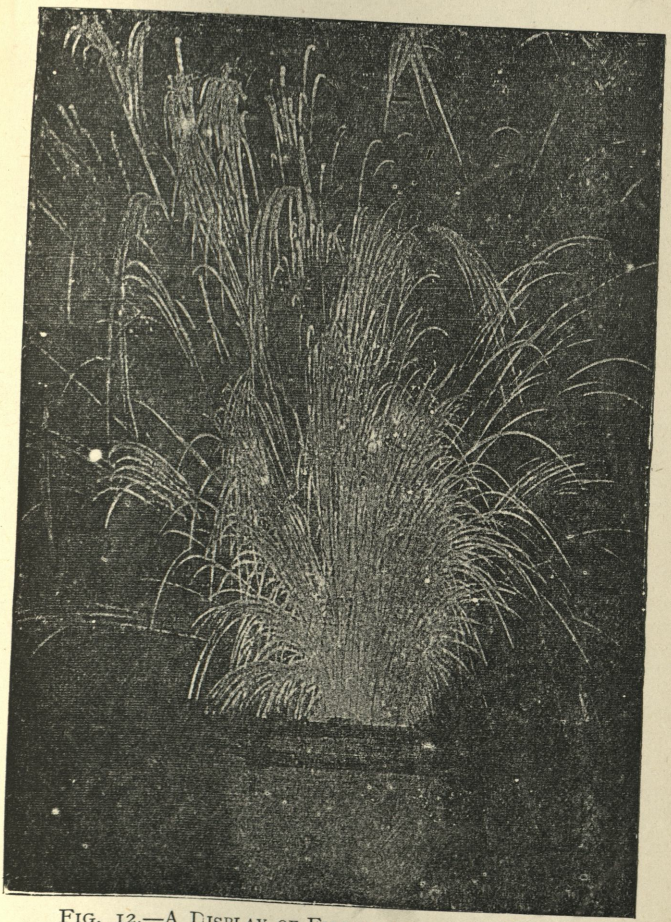


FIG. 12.—A DISPLAY OF FIREWORKS IN THE HARBOUR OF MOULINS (FRANCE).

*Photographed by M. A. Buguet.*

## TESTING THE LIGHT OF A GLOW-WORM UPON A SENSITIVE PLATE.

To carry out this interesting experiment, one of the well-known shining little glow-worms *(Lampyris noctiluca L.)* which, during the last half of the month of June, will be easily detected at night in moist, warm places, is placed on a gelatine plate, preferably on its reverse side, so that the action of its phosphorescence may be placed beyond doubt, and allowed to walk to and fro for a few minutes. If the plate is then developed, the marks of the marching glow-worm will be quite distinct. The places where it remained stationary will, of course, be the most intensely affected ones, but the plate will probably show also all gradations from the lightest shades—which correspond to the quickest pace of the worm—to complete opacity. (17.)

# CHAPTER II.

## CURIOSITIES.

## CHAPTER II.

### DOUBLE-POSE PHOTOGRAPHS.

A double-pose photograph, or, shortly, a "double," means a representation of

FIG. 13.—DOUBLE-POSE PHOTOGRAPH.

the same individual in two places in one picture. So, for instance, a gentleman may be represented playing chess with himself, or a person shaking hands with himself, etc. These photographs can be easily and perfectly produced by means of a simple arrangement which may be added to any rigid camera. Mr. H. P. Robinson has described such an arrangement many years ago. A diaphragm, A (fig. 14), is fixed in the camera immediately in front of the grooves in which the dark slide is inserted, having an aperture measuring for cards about 4 by $2\frac{3}{4}$ inches. A piece of zinc, B, is made to fit against the studs b b; it rests on the studs c c, and is secured in its place by the button d.

To take a picture, the sitter is placed so that the image shows on the ground glass through the aperture left uncovered by the mask of zinc. The plate is now exposed, the zinc reversed to the other side of the aperture, and the sitter is also

moved so as to appear on the ground glass through the aperture left open, and the plate is again exposed. Care must be taken that neither the furniture and accessories nor the camera are moved during the operation. If the zinc mask

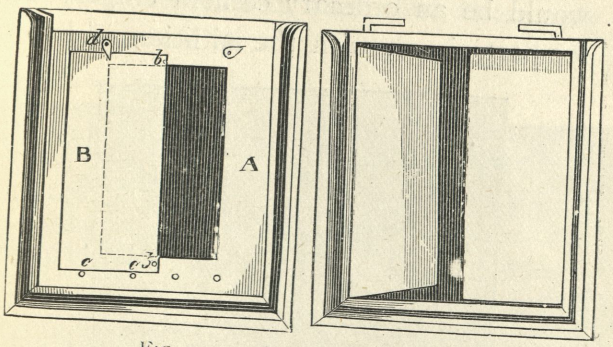



FIG. 14. FIG. 15

ARRANGEMENTS TO PRODUCE DOUBLETS.

has been made to fit properly, it will be found on developing that there is not the slightest trace of a join to be seen, even when a plain background has been employed, because the diaphragm being placed a short distance from the plate,

the edges of the shadows are not sharp, and they overlap, and are vignetted, as it were, into each other.

The various parts of the arrangements should be all painted black.

More convenient than this arrangement would be an ordinary camera employed for portraiture, with the addition of two

FIG. 16.—DOUBLE-POSE PHOTOGRAPH.

doors meeting in the centre, and which might be moved by handles or buttons from the outside, as shown in fig. 15, and used in the same manner as the one described above, except that instead of the zinc mask being altered, the doors would be opened and shut alternately by the handles.

FIG. 17.—DOUBLE-POSE PHOTOGRAPH.

A very curious effect has been produced by making a picture of a man shaking hands with himself. For this purpose it will be necessary that the two hands shall be held singly in exactly the proper place to represent the grasp of friendship in the usual form. To do this a rest for the hand is absolutely necessary, which, however, must be invisible. For this purpose a dark-coloured thread is stretched in the following manner:

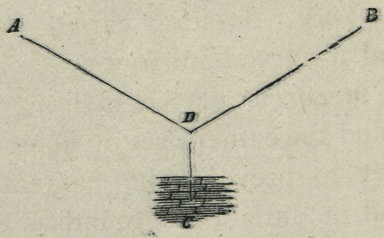



FIG. 18.—REST FOR THE HANDS.

The ends A and B (fig. 18) are fixed to the walls of the room, and C to the floor. The angle D forms the required

rest; the threads, if they are of the proper shade, will not show in the photograph, and the hands join in the most natural way possible.

The original photographs of the annexed illustrations (figs. 13, 16, and 17) have been produced by aid of a similar arrangement. (18.)

## CARICATURE PHOTOGRAPHS.

These may be produced in different ways. Very drastic caricatures are obtained if curved mirrors are used. A convex mirror is placed in front of the sitter, and the camera set up behind him. In order to prevent the camera being reflected, a dark background is placed between the two provided with a round aperture, through which the lens of the camera is pointed at the sitter. This aperture may be easily rendered invisible in the negative by retouching. Carpets

are better left out. The convex mirror in front of the sitter should be fixed on a stand, on a head-rest for instance, which enables it to be raised and lowered. If

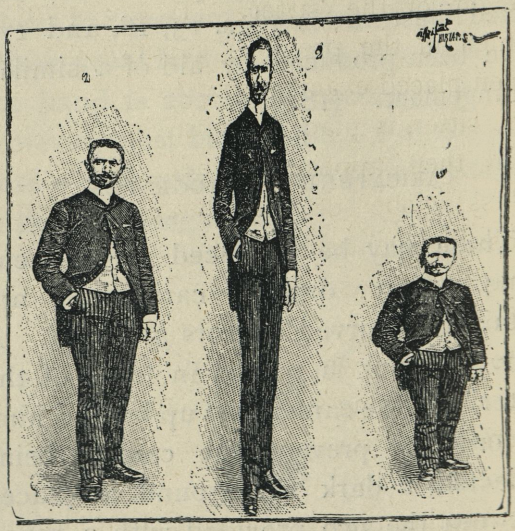


FIG. 19.—CARICATURE PHOTOGRAPH.

it is desired to photograph a person so that the head appears very large and the figure dwarfish, the mirror should be

raised so that it is placed in a plane with the head of the sitter. On the other hand, caricature photographs with large figures and small heads are obtained by lowering the mirror to one-third of the height of the sitter. If the camera, which in the previous experiments has been placed exactly opposite the head of the sitter, is placed sideways, the person will then appear curved. A silvered glass globe of the largest diameter possible, such as is found in many gardens, may be used as a convex mirror. Various effects may be secured also by altering the angle at which the mirror is placed, or substituting for it a long, egg-shaped concave mirror, placed lengthways or the reverse. (19.)

Another plan consists of the following: A foreground, on which a grotesque body ("grotesque diminutive," as it has been called by the American inventor) is painted—for instance, a flying goose, a

man riding a donkey, a baseball player, a man standing in a hat, etc.—is held by

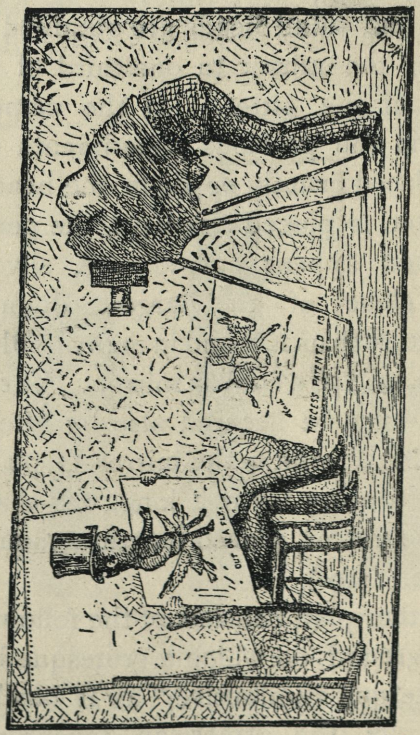



FIG. 20.—TAKING A CARICATURE PHOTOGRAPH.

the sitter on his knees, so that his head appears just above the neck of the

painted body while the exposure is being made. In the finished photograph the caricature appears with the sitter's head. The upper edge of the foreground, which in the negative crosses


FIG 21.

the neck of the sitter, is removed by retouching.

By this plan a fresh sitting is required for each caricature body. When small

outlines are used, they should be copied photographically, when the negative may be used in combination with any head, by masking and double printing. If a large number are required of one subject, a print may be made from the body negative, and one from the head.

The two are then cut to join properly, mounted on a card, and copied, so that the printing is done from one negative. (21).

## PHOTOGRAPHIC GHOSTS.

Many a plan has been suggested for producing spirit photographs, and one method is to take advantage of the optical principle known as fluorescence. Paint on a white screen with sulphate of quinine (which is colourless) something shadowy to represent the "ethereal being." Expose this to bright sunlight for a short time,

and then place the unsuspecting believer in "guardian angels" before this screen,

FIG. 22.—SPIRIT PHOTOGRAPH.

photograph in the ordinary way, and at the same time a hazy picture of the

quinine drawing will appear to hover over the sitter. The invisible rays from the fluorescent quinine have actinic power, and can be photographed.

Another method by which the most striking results can be obtained, which may serve to illustrate the most harrowing ghost stories which the imagination can invent, is the following: The background should consist of dark furniture, so as to give a sombre aspect to the scene. Now, considering that the spirit is generally clothed in white, and that a vague, weak, and feeble image of it is more impressive than a distinct one, it is generally sufficient if one-tenth of the total exposure is given whilst the "spirit" is present. It is also desirable to put the camera out of focus during this part of the exposure, say, a quarter of an inch out for a lens of six or eight inches focus. Of course, this tends to a lack of sharpness on the part of the material sitter; but

if the apparatus is put back to the true focus for the remaining nine-tenths of the exposure, nothing is noticeable. As far as practicable, it is desirable that the "spirit" should be more equally lighted than the material sitter, and the total exposure should be as much as the plate will bear, otherwise the "spirit" may come out with only the high lights visible. (22)

## PHANTOMS AND NECROMANCIES.

may also be quite easily produced in the following way. In a sheet of waste paper of about twelve inches diameter, two holes are cut out, to serve for the orbits of the phantom's cranium, and the paper is rounded a little. This paper is now fixed to a stick, which is held obliquely in the field of the lens.

During exposure the paper is kept still for a few moments, so as to render the head of the phantom distinct in the negative, then the stick, together with the paper, is slowly drawn downward and away from the field of the lens in a curved line which approximately copies the form of a human body. By this plan a phantom may be produced (see fig. 23) which seems to sail through the room as if driven by the wind, and the head, the arms, and the body of which can be distinctly discerned in the picture. (23.)

## PHOTOGRAPHY OF THE INVISIBLE.

Fluorescent substances, such as bisulphate of quinine, which we have mentioned above in describing the production of spirit photographs, or uranium glass, have the power of altering the refrangibility of the violet or chemical

rays of light, hence, although paper painted over with bisulphate of quinine will look nearly white, it will appear in a photograph as if it were nearly black. Designs which are traced by a solution of this substance on white paper, and which are nearly invisible to the eye, are boldly visible in the photograph. The following experiment may be made: A colourless solution of bisulphate of quinine is placed in one glass, and some ink in another glass; when both glasses are photographed, they will come out equally black. (24.)

## PORTRAITS WITHOUT HEADS.

The photograph of a man holding his own head in his hand or carrying it on a plate, etc., has always a very strange effect. Producing such pictures is not very difficult; it only requires some skill in combination printing. The sitter is photographed in front

of a white background, and his hand arranged so as if it were holding some object. In the finished negative the picture is at first entirely stopped out with black varnish on the back, with the exception, however, of the head of the sitter, which is printed alone on the sensitive paper. Then the negative is taken out of the printing frame, the black varnish is removed from the back, and the head is now stopped out, and likewise that part of the negative corresponding to the place of the previously printed head. In printing the figure, the sensitive paper must be laid down on the negative so that the print of the head exactly covers the place prepared for it by the spot of black varnish. (25.)

### PORTRAITS IN IMITATION OF OLD PAINTINGS.

To produce these, Professor Klauser suggests the following plan: For a back-

ground procure a coarse canvas. Nail it with tacks on a frame, say, two or three yards long, and stain it with a medium dark brown colour, mixed with water and a little glue or skimmed milk, taking care not to clog the threads of the canvas. Place the sitter against this background, and after exposure, according to the sensitiveness o the plate, close the cap, remove the plate-holder, and without moving the camera from its original position, focus anew on the canvas, the figure, head-rest, etc., having been removed. Expose again for the canvas, the same duration as for the portrait, or longer if the texture of the canvas is desired to show more prominently. In order to facilitate the focussing on the dark background, pin a scrap of a large printed newspaper advertisement on it. The time of exposure on the plain canvas will depend on the rapidity of the plate and of the lens. If not long enough, the

lines of the canvas will show but faintly; if too long, the canvas lines will be too prominent. Any sea or landscape negative might be treated in a similar way in order to give it the appearance of a copy from an oil painting by an after-exposure, before developing, on a plain canvas, which, for this purpose, should be of a finer texture, and a rectilinear lens used instead of a portrait combination. The printing ought to be carried somewhat deeper than for ordinary portrait negatives. (26.)

### PORTRAITS APPARENTLY BLINKING WITH THE EYES.

In order to produce these portraits, the sitter is first photographed with his eyes closed, and then once more with his eyes opened. The two negatives are pasted on the opposite sides of a piece of transparent paper, so that they are in contact, the corresponding parts of the two exactly

falling one over another. If the whole is now held in front of a flaring candle or any other flickering flame, the combined portrait will show vivid alternations of opening and closing the eyes, which produces a striking effect. (27.)

## PHOTOGRAPHIC SILHOUETTES.

Well-made silhouettes, which were very familiar to those who lived in the pre-photographic period, are particularly useful in studying family characteristics, which no doubt are, on the average, far better observed in profiles than in any other single view of the features. There are two methods by which silhouettes may be produced photographically. For the first method the following things are required: Two backgrounds, standing on castors (if possible of a dark colour, if not pieces of black calico can be hung over them), a third background of white muslin, and several yards of black calico.

Now put the two dark backgrounds nearly parallel to each other, and far enough apart to place the sitter between them. Throw the pieces of black calico over the backgrounds, thus forming a tunnel, at the end of which place the white screen,

FIG. 24.—A PHOTOGRAPHIC SILHOUETTE.

tipped back slightly to reflect the greatest possible amount of light into the camera. At the other end put the camera, and focus on the sitter's profile. Insert a small stop so as to get the outlines well defined. Should too much light enter

this camera obscura from the side where the camera stands, shut it out by means of strips of black calico. A little light gives faint detail, and is not at all hurtful.

The second method consists of the following: A light frame, from four to six feet square, is filled with white tissue paper, and placed in a well-lighted window, and blinds or shades are arranged so as to prevent all other light from entering the room. The sitter is placed in profile against this background. In the evening, or after dark, the placing of one or two bright lights behind the translucent background serves a similar purpose. If the white background be opaque, then it must be illuminated by a powerful light from the front, but still so arranged that none of it fall either upon the camera or on that side of the sitter which is nearest the camera, for what is required is to make a strong picture of the background with the sitter interposed

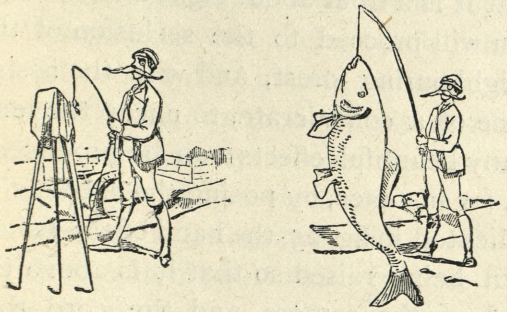
in profile as a black shadow. It is obvious that the sitter must be sharply focussed, and that no diaphragm will be required in the lens. A quick exposure being given, and the development a little forced, a negative is obtained in which the background is opaque and the sitter quite transparent, which, when printed, yields a black figure on a white ground.

To obtain a more powerful illumination, and consequently deeper shadows, the magnesium flashlight may be used as an illuminant. The photographic silhouette may then be taken as follows: A piece of muslin is tacked in front of a window, and the sitter placed directly in front of it. All other light in the room is shut off. Focus, fire, and develop as described above. (28.)

### PHOTOGRAPHY FOR SPORTSMEN.

It is a well-known fact to all amateurs that a subject becomes so much larger in

proportion in the negative the nearer it is placed to the lens, or *vice versâ*, so much smaller the greater the distance is between it and the lens. This defect is exhibited in an exaggerated degree by lenses of a short focal length; and subjects placed in the foreground then appear disproportionately large in comparison with those which are



FIGS. 25 AND 26.—THE FISH, BEFORE AND AFTER BEING PHOTOGRAPHED.

more distant. But this apparent defect also has its advantages, as the above illustrations show. The sportsman, for instance, who carries with him a simple photographic apparatus and a few dry

plates can present such unquestionable evidence of his prowess, that, on his return to civilisation, no one will dare to question the truth of his assertions. An example will suffice to direct the enterprising and intelligent amateur into the path of "scientific" photography.

Having caught a fish (let us assume that it is a trout about eight inches long), you will proceed to the seclusion of the neighbouring forest, and with the assistance of a confederate, to uncap the lens, many beautiful effects can be produced; as, for instance, by posing the subjects as indicated in fig. 25, the hand of the fisherman being raised so that it is above the field of the camera, and the cord that suspends the fish being in the same vertical plane with the hand. The resulting picture is shown in fig. 26.

By the same method a domestic cat can be converted into a panther or mountain lion, and a young Newfound-

land pup into a bear—which hints we give in the interest of the hunters who wish to preserve an authentic record of their bags. (29.)

## PORTRAITS IN PAIRS.

To make portraits in pairs—of a young couple, for instance, who wish to be taken separately but facing each other, and with equal illumination in both cases —the following method avoids a great deal of unnecessary trouble, in moving backgrounds, accessories, etc.: Mrs. A. is taken first in the ordinary way. Mr. A. wishes to face his beloved. Just sit him down in the same chair, in the same position, if you like; focus, etc. Retire to the dark room, put your plate into the slide, but be sure and put it in the reverse way, film side uppermost and the back towards the lens. Allow just the thickness of the glass plate in

focussing, and expose and develop as usual. (30.)

## MIRROR PHOTOGRAPHS.

Many years ago there were to be had in commerce so-called mirror photographs, which were produced in such a manner that the silvered or platinised glass carried upon its metallic or reverse side a positive collodion picture instead of the opaque varnish or coating of shellac usually applied, the photograph being put face downwards upon the metal. When the light is reflected upon the mirror, the same appears as a looking glass, but in transmitted light the photograph becomes visible, although, of course, somewhat indistinctly and faintly.

A very simple plan for producing these mirror photographs is the following: A well-cleaned piece of plate glass is silvered according to one of the numerous and well-known methods, to such a degree

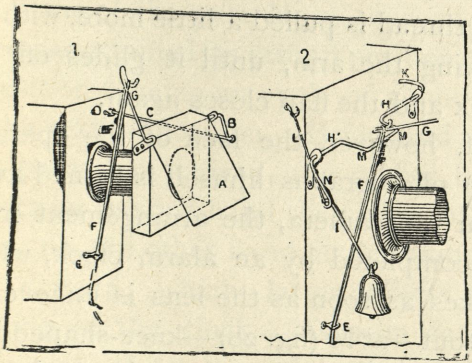
only that the reduced silver appears with a brillant auriferous hue, so that one is able to distinguish well any objects placed behind it. The silvered plate is well rinsed in distilled water, and then put into a dish of the same, in which there is floating an undeveloped carbon print. This, after saturation in the cold water, is placed upon the silvered surface, and the superfluous water removed by means of a rubber squeegee. When it has dried upon this surface it is developed, as in the manner of ordinary carbon prints, in warm water, and subsequently tinted by immersion in a bath of aniline red or aniline violet. The image upon the silvered surface is finally coated with some transparent negative varnish. As the perfect silvering of the glass depends very much upon the cleaning of the glass plate in the first instance, it is well to put the glass plate for a short time into a solution of dilute silicate of potash,

and then to polish well with a clean cloth. (31.)

### PHOTOGRAPHIC SELF-PORTRAITS.

If the amateur wishes to photograph himself, the following arrangement will prove useful in cases where several seconds will be required for exposure: A wooden plate, perforated in its centre, is put upon the lens tube; it is provided with a flap A (fig. 27), which is formed by a single iron wire, the whole being covered with black velvet. It shuts tightly by means of a rubber band, C, which is fixed by the one end to the lever B, and by the other end to the hook D, which is inserted in the camera front. To manipulate the flap, a thread is used, one end of which is held by the operator so that it cannot be preceived in the picture. The thread runs down to the ground, passing under the foot of the operator, and reaching to the tripod stand, where

it at first runs through a screw eye, fixed to one of its legs, and then through another screw eye, attached to the camera front, and ending finally in a loop. The flap has at the end opposite to the rubber band an arm, G, which forms an elongation of the iron framework, and at the




FIGS. 27 AND 28.—SHUTTER ARRANGEMENTS FOR THE PRODUCTION OF PHOTOGRAPHIC SELF-PORTRAITS.

hook-shaped end of which the loop of the thread is fixed. This hook is just sufficiently long, that the thread glides off as soon as the flap is opened too much; and as soon as this takes place,

the shutter closes. In taking the photograph so that the face of the operator is directed towards the camera, there is no difficulty in exposing, since one sees when the lens is uncovered by pulling the thread; the pulling is then stopped, and after the exposure has been sufficient the thread is pulled a little more, without moving the arm, until it glides off the hook and the flap closes again.

If, however, the face of the operator who photographs himself is turned away from the camera, the arrangement must be completed by an alarm clock, which strikes as soon as the lens is uncovered. A stout—at M (fig. 28)—knee-shaped iron wire, which is placed opposite to the end of the lever G, moves in two perforated plates attached to the camera front, so that it is able at any time either to raise or to lower the lever, as it is required. This bent iron wire is combined at one end with a lever, T, to which a small

clock is soldered. At the other end the wire is turned up at K, in order to prevent the knee being raised too much. A rubber band, L, being fastened by one end to the camera, while the other end is about two inches distant from the turning point, H', is so arranged that it is within the plane of the part N, as soon as the knee has attained its central position, *i.e.*, a position forming an angle of about 45° to the vertical position. Before and after this point has arrived, the rubber band effects on the one hand the raising of the knee, on the other hand its knocking at the camera, which latter effects the striking of the clock. As soon as this takes place the pulling of the thread must be interrupted, since the unevenness of the ground and the extensibility of the cord are causing the flap to be raised a little more than one thinks it to be the case, and it is then only necessary to pull very gently in

order to cause the loop to glide off the hook. (32.)

## COMPOSITE PHOTOGRAPHS.

The principle of the process of making composites consists in throwing faint images of a succession of accurately adjusted prints or negatives on the same part of a single sensitive plate, so that the resultant image is an aggregate of all its components, and a pictorial average of them.

Mr. Francis Galton, the inventor of this system of composite portraiture, employs an apparatus consisting of the front of a camera fixed firmly on a solid board, with its back screwing out or in for purposes of focussing; in front of the lens there is a carriage, which can be moved to and fro on a tramway along the board, and which supports a stage provided with certain adjustments, to which the print is fixed. The print can be raised or lowered, it can be moved from

side to side, and it can be rotated. Consequently, whatever sized print is mounted on the stage, and in whatever position it may originally have been placed there, an image of it can be produced in the camera of any required size, and that image can be caused to fall in any required position on the sensitised plate.

The required position is defined by fixed fiducial lines to which the image is adapted by the requisite adjustments of scale and position. When making full-face composites, the operator looks through an eye-hole down upon a piece of horizontal ground glass (b, fig. 31) let into the roof of the camera. Two images are seen there; the one is that of delicate and bright fiducial lines similar in shape to those in fig. 29, and the other is the image of the portrait which has been thrown upwards by a

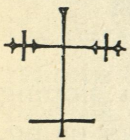


FIG. 29. FIDUCIAL LINES.

hinged mirror, a, that lies inside the body of the camera (fig. 31); the dark slide, c, of the camera is made stationary. The pupils of the two eyes in the image of the print should be exactly bisected by the upper of the two horizontal fiducial lines, and equidistant laterally from the vertical line, for determining which the little cross lines give great assistance. Besides, the parting of the lips in the image should coincide with the lower of the horizontal fiducial lines (fig. 29).

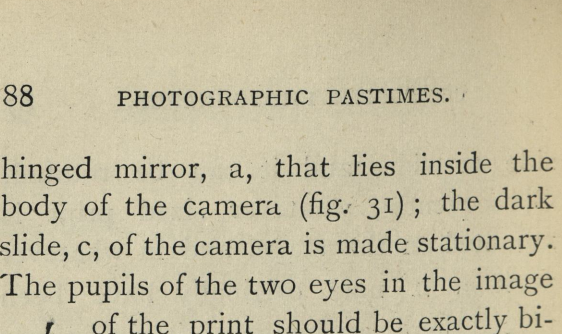
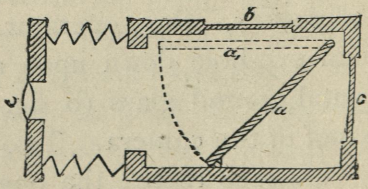


FIG. 30. FIDUCIAL LINES.




.—CAMERA FOR THE PRODUCTION OF COMPOSITES.

For taking profile portraits a sloping line with two horizontal ones, as in fig. 30, are used, and the image of the print adjusted so that its forehead is touched

by the upper end of the sloping line, and the position of the front of the gums of the middle teeth in the upper jaw of the image should be touched by the lower end of the sloping line. The line through the centre of the pupil of the eye in the profile image, and that through the parting between the lips, are then made, as before, to correspond with the upper and the lower of the two horizontal fiducial lines.

After adjusting each portrait in turn in this way, and then, after capping the lens and turning the hinged mirror out of the way, as shown by dotted lines in fig. 31 (a'), the dark slide is raised. Then withdraw the cap, give a brief exposure, and re-cap. Immediately afterwards close the dark slide, turn back the mirror, and remove the cap, then you are free to set to work with the next of the series of the portraits in the same way as that just described.

As previously mentioned, all the portraits are blended so as to obtain an average of expression, the time of exposure being divided into as many equal fractions as there are portraits to be averaged, all these fractional exposures being made on the same sensitive plate. If, for instance, 60 seconds be required for the production of a good copy of one of these portraits, and six portraits ought to be blended, then each fractional exposure would amount to one-sixth of the full exposure, namely, to ten seconds.

The illustrations (figs. 33, 34, and 35) give an idea of the results obtainable by this method. Figs. 32 and 33 are reproductions from photographs taken by Mr. F. Galton. The four ovals, A, B, C, D (fig. 33) are composites, and the portraits in fig. 32 are individual portraits (Jewish boys in the Jews' Free School, Bell Lane). A is the composite of the five individuals $a_1$ to $a_5$. B is the com-


FIG. 32.—INDIVIDUAL PORTRAITS, OF WHICH THE PORTRAITS A AND B (FIG. 33) ARE COMPOSITES.

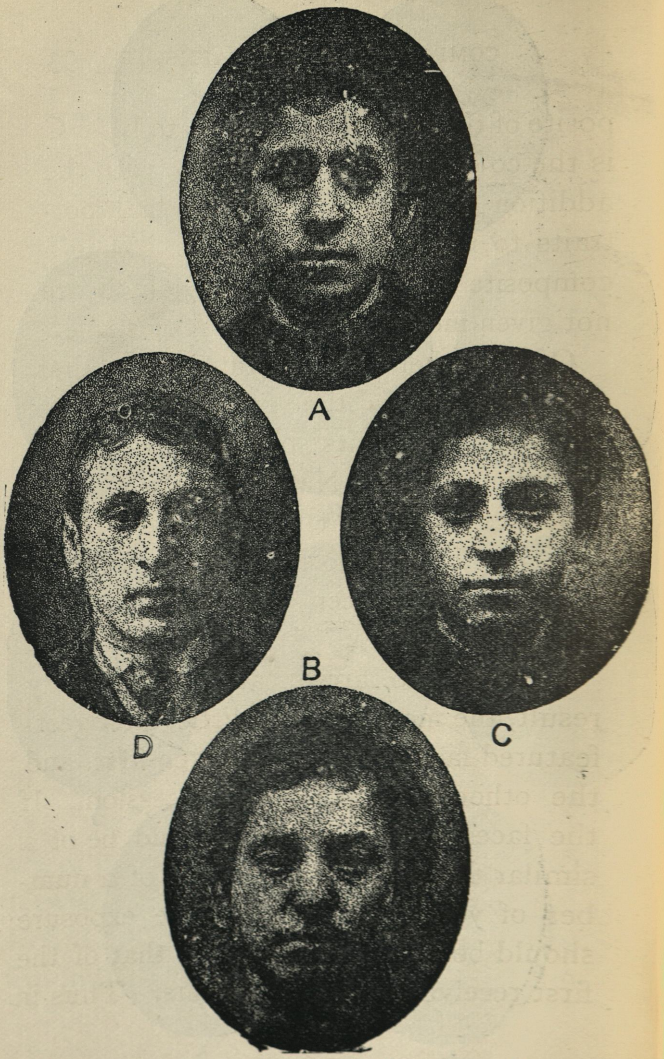



FIG. 33.—FOUR COMPOSITES OF THE INDIVIDUAL PORTRAITS SHOWN IN FIG. 32. (*Description, see page* 90.)

posite of the five individuals $b_1$ to $b_5$. C is the co-composite of A and B, with the addition of three other individual portraits to increase its sharpness. D is a composite of five adult faces, which are not given individually for want of space.

Of the other two illustrations, the first one (fig. 34) is the composite of the individual portraits of twelve mathematicians of the National Academy of Sciences of Washington, the second one (fig. 35) the composite of the individual portraits of sixteen naturalists of the same society.

In order to arrive at a satisfactory result, the most characteristic, strongest-featured face ought to be taken first, and the others in declining succession. If the faces to be combined should be of a similar texture, as in the case of a number of young ladies, then the exposure should be duly proportioned; that of the first receiving the longest time. Thus in

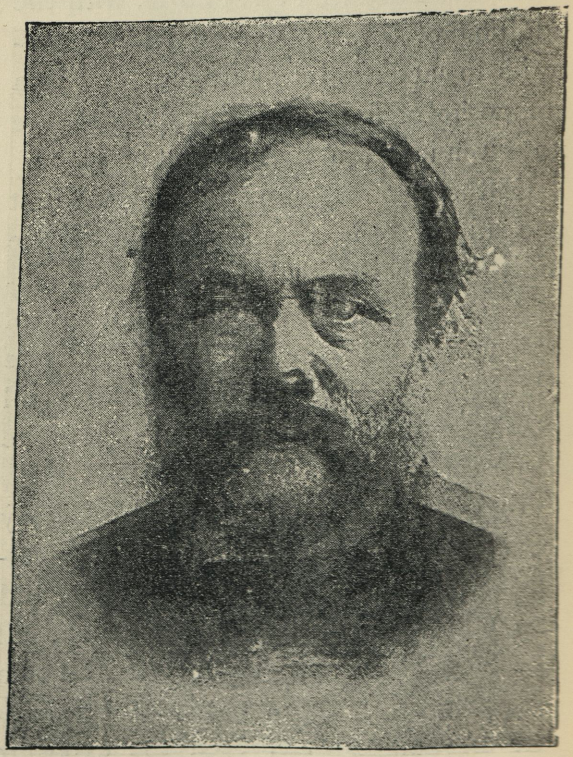


FIG. 34.—COMPOSITE PHOTOGRAPH OF 12 MATHEMATICIANS.

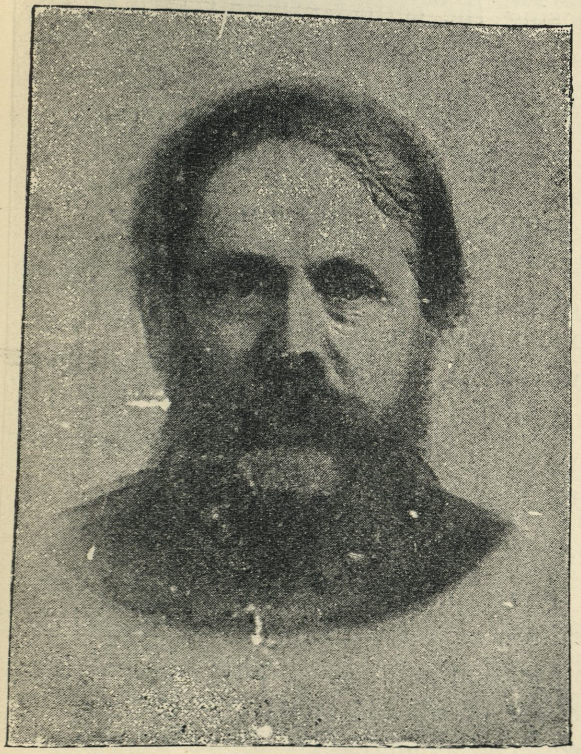


FIG. 35.—COMPOSITE PHOTOGRAPH OF 16 NATURALISTS.

a case of portraying five sisters, supposing the correct exposure of a single face on a slow plate should be two seconds, divide the time as follows: Give the first face 3, the second $2\frac{1}{2}$, the third 2, the fourth $1\frac{1}{2}$, and the fifth one second.

Composite pictures are of value only when restricted to one family, to one nationality, to one tribe. When extended to a heterogeneous class of forty or more individuals, the result will tend to illustrate not the average intelligence, but the average imbecility of the class, be it of professors or pupils. (33.)

### STATUARY PORTRAITS.

These pictures are photographic portraits which for the moment make the impression of photographic copies from plaster or marble busts. They may be produced as follows:

At first a pedestal is procured, consisting of a wooden stand with a recess,

which outwardly shows the shape of a pedestal in imitation of marble or plaster. The sitter kneels or stands behind the stand, pressing his body into the recess. Then, as far as it seems to be necessary, his breast is uncovered, and a white cloth placed round it, and arranged artistically in delicate folds, so that a connection with the pedestal is produced by it. As a background a black cloth or any other very dark material is used, and to impart to the bust the appearance of plaster or marble, the face, the neck, the arms, and the hair of the sitter should be thoroughly powdered with rice flour. After developing and finishing the negative a sharp penknife is passed round the outlines of the figure and of those parts of the bust which are to be reproduced, and the portions of the negative outside this incision are then scratched off. In this way in printing a white statuary portrait on a black ground is obtained.

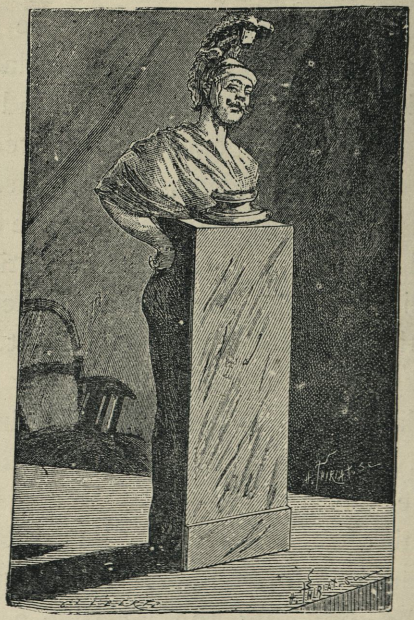


FIG. 36.—ARRANGEMENT TO PRODUCE STATUARY PORTRAITS.

The statuesque photograph of which we give a reproduction in fig. 37 was produced in a somewhat different way. A screen was obtained the shape of the bust required, and made of some very dark material (red baize was found to

FIG. 37.—STATUARY PORTRAIT.

*Photographed by Messrs. Turnbull & Sons, Glasgow.*

answer very well). A dark background was used, and a solid pedestal was placed in front of the screen, where it was arranged in its proper position. The bust appeared above the top of the screen, and all else was thus masked. (34.)

### PICTURES IN VAPOUR.

The method of producing these pictures is based on the carbon process, a knowledge of which is supposed. It consists in the following: If the negative to be printed be a rather dense one, tissue of the ordinary transparency kind may be chosen, and one less loaded with colouring matter if the negative be weaker in character. The bichromate bath should not exceed the strength of five per cent. The tissue is immersed only for a short time in the solution, squeegeed off, dried quickly, and used speedily. It is exposed as usual beneath a negative, and then coated with a collodion

composed of five grains of pyroxyline dissolved in an ounce of a mixture of equal parts of methylated spirits and methylated ether, and allowed to partially dry. A clean glass is then taken and coated with the same, and washed in clean water until the greasiness has disappeared, when it is ready to receive the tissue. That may now be plunged into the water and left for a minute or so, but not till it begins to curl outwards, otherwise its absorptive nature will have been too much satisfied, to the detriment of its power of giving a good vapour picture. When ready it is lifted out of the water, squeegeed in the usual way, covered with two or three layers of blotting paper, and placed under a weight for an hour or more, after which the glass is taken, placed in boiling soda water, then the tissue is pulled away from the layer of collodion, and placed to dry. That the layer of collodion on the tissue should not be too horny or dried

too much, nor the tissue allowed to absorb too much water, are important points. When the plate has become quite dry, its surface will have a glossy appearance, which will not exhibit any peculiarity until a little moisture is condensed upon it, and then it will be found that the film is capable of disposing of what would on a clean plate of glass be an even layer of fog in such a way that a picture possessing the most delicate gradations of the original will be presented to view, which disappears as the dampness evaporates, and is again renewed when subjected to its influence. The phenomenon is a very singular and pleasing one, and is both curious and interesting. (35.)

### MAGIC PHOTOGRAPHS.

These photographs are made by rendering a silver print invisible by means of bichloride of mercury, and then causing

it to start into existence at any future time by placing it in contact with a damped sheet of filter paper, previously saturated with hypo.

The preparation of the paper may be done as follows: Well-sized, smooth letter paper, or better, photographic plain paper, is soaked for about three minutes in a solution of two parts of common salt in 100 parts of water, and then hung up to dry. The back of the paper should be marked with a lead pencil, as it will otherwise be found difficult to discern the prepared side. After drying, it is placed with the prepared side down upon a solution of 10 parts of lunar caustic in 100 parts of water, then it is allowed to dry in the dark. Printing is done as usual beneath a negative in the printing frame.

The prints are not toned, but only placed in a solution of 10 parts of hypo-sulphite of soda in 100 parts of water,

and then thoroughly washed. The prints are then floated on a bath consisting of five parts of bichloride of mercury in 100 parts of water, when they will begin to bleach, and at last to become entirely invisible. As soon as this is the case, they are washed out in water and dried.

To render such a picture visible again, it is only necessary to place it in a dilute solution of hypo, or, better, of sodium sulphite. Another plan consists in pasting to the back of the picture a piece of blotting paper with its edges only, which has previously been saturated with a solution of sulphite of soda; it is then only necessary to place the picture in ordinary water to render it visible.

A still more efficient method by which a form of invisible photograph can be produced, which can be rendered visible in a few seconds, and in a few seconds more again invisible (which is not possible

with the above-described method), is the following:

A piece of stout bibulous paper, or of fine writing paper, is floated for a few minutes upon a weak solution of gelatine (of about ten grains to the ounce), the temperature of which is raised to about 80°F., when it is dried and placed in a bath consisting of a solution of two parts of bichromate of ammonia in 48 parts of water, and after a few minutes allowed to dry in the dark. The paper so prepared is exposed under a vigorous negative for about the same time as a silver print, a well-marked bronze image on a yellow ground being obtained. This is washed at first in cold, then in a few changes of warm water, to one or two of which a little carbonate of soda has been added, to gradually remove the green tint of the image (caused by the sesquioxide of chromium, which is formed by decomposition of the chromate of

chromium in the water), leaving a colourless image of gelatine. It is then left to soak for a few hours, after which it is dried. After drying it is only necessary to float the print for a few seconds in water, to render the image visible. The gelatine has been rendered insoluble and non-absorbent wherever light has acted upon it sufficiently, and therefore it remains comparatively opaque when brought into contact with moisture. But in the lights, where the gelatine has been protected by the dense parts of the negative, it maintains its solubility, and is readily removed, as well as all traces of the unaltered bichromate, by the washings in warm water, and the bibulous paper in these parts retains its ready capacity of absorbing water, becoming transparent when wet. The process can be repeated at will. (36.)

### LUMINOUS PHOTOGRAPHS.

There are several methods of producing

photographs which shine by their own light in the dark, and all of them are not only singular, but in many respects beautiful and instructive.

Balmain's luminous paint, which may be bought in the form of water colour (dry powder), is a very suitable material to use for this purpose, but you will not find any particular difficulty in preparing the phosphorescent body yourself. One mode consists of the following: Powdered oyster shells are heated very strongly in a loosely-covered crucible with their own weight of sulphur, or plaster of Paris is made into a paste with solution of gum tragacanth. When dry, the latter is ignited in a covered crucible for half-an-hour or so. The product, when cold, must be powdered and preserved in a dry bottle. Another mode consists in heating very strongly in a covered crucible powdered heavy spar or sulphate of barytes, previously made into a paste

with solution of gum tragacanth. After heating for about half-an-hour, a whitish product is obtained, which should be reduced to fine powder and preserved in a well-closed bottle.

A sheet of ordinary albumenised paper is laid, back down, upon a pad of moistened blotting-paper. The moisture from the latter gradually makes its way through the paper, and renders the albumen film tacky. The powdered phosphorescent body is then dusted over the surface, and then evenly spread with a pad of cotton wool; the excess is dusted off the sheet and the whole held to the fire for about a minute, in order to dry the surface thoroughly. The sheet so prepared will shine brightly when brought into the dark after exposure to sunlight, and, prior to experimenting with it, should always be kept in a dark place between folds of dry blotting paper.

A good transparency is placed in con-

tact with the sensitive surface of the prepared sheet, and exposed for a few seconds to sunlight, or for a somewhat longer time to magnesium light. On then removing to a dark room a beautiful and ghost-like photograph at once makes its appearance, all the shadows being well defined owing to the absence of light, and the lights being marked by a pale, unearthly glow.

These pictures gradually undergo decomposition on exposure to the air, which affects materially their power of emitting light after insulation. To overcome this difficulty, the following plan has been recommended: Some paraffin, a good paraffin candle, is melted and poured out on a glass plate; when perfectly cold the layer of paraffin is detached from the glass, and the surface of the former warmed so as to soften it, and then the phosphorescent body, in fine powder, gently rubbed in, so as to ensure

a perfect coating. The coated paraffin is then laid, with the phosphorised side down, on another very thin glass plate, which has been previously well cleaned, and which is then heated sufficiently to melt the paraffin and attach it and the imbedded phosphorescent film to the glass. The exposure of this plate is done in the same manner as that of the phosphorescent paper.

Another plan is the following: Spread as evenly as possible a thin coating of starch paste on a sheet of cardboard, and when still tacky dust over it powdered calcium or barium sulphide (or Balmain's luminous paint), rubbing with a brush in order to make it adhere everywhere. On the other hand, imbue a positive proof—printed rather light, toned and fixed as usual—with castor oil, and rub off the excess with a clean rag. This done, paste the transparent proof on the prepared cardboard, and dry the whole be-

fore the fire. After exposure to light, the proof will be phosphorescent in the dark, and that without much alteration in its general appearance, since the light is necessarily transmitted through it to the sulphide in proportion to the various intensity of the tints forming the image, the whites being very phosphorescent, while the darks emit but little light.

It should, however, be borne in mind that ordinary silver prints by direct contact with sulphide are soon attacked and covered with yellow spots. If it is desired to produce luminous photographs which keep, it is therefore necessary to produce them with thin, tender carbon transparencies or with collodion films. The procedure is then as follows : A cardboard is covered or dusted over in the above-described manner wilh the phosphorescent body, and after drying it is well rolled. On the other hand, a positive is printed beneath a negative on a glass plate

coated with collodion emulsion, and the film of collodion, containing the positive image, is then stripped in the well-known manner, and fastened by means of damar varnish to the luminous paint.

Or: A glass transparency produced in the usual manner is provided on its back with luminous paint, which after drying is covered with a piece of paper to protect it well. The transparency then looks like an enamel picture in daytime, while it shines with a nice effect in the dark if looked at through the glass. (37.)

# CHAPTER III.

## PHOTOGRAPHING BY MEANS OF PECULIAR ARRANGEMENTS.

## CHAPTER III.

### PINHOLE PHOTOGRAPHY.

As is generally known the purpose of the photographic lens is to collect the rays of light emitted by the various points of the subject to be photographed to one point, so as to produce a sharp image of the whole. If a simple very small opening—a pinhole—is substituted for the lens, a collection of the entering rays of light to a point no longer takes place, but the single rays of light will occupy a larger plane, corresponding in size to the diameter of the pinhole, and the image projected on the sensitive plate will consist of many minute, partially overlapping pictures. Photographs produced by the aid of a pinhole, therefore, cannot be of absolute sharpness, but, notwithstanding, by

means of this primitive arrangement quite useful results may be obtained in cases where an uncertain general expression of the subject is sufficient. There are even some points connected with it that render it superior in some respects to the photographic lens, apart from the fact that no expensive apparatus is required. Thus, for instance, the pinhole camera gives a field up to 120°, so that it is possible to photograph with it very high and extensive subjects from a comparatively very near standpoint, and on any desired size of plate. Then it gives, provided that the camera has been placed perfectly rigid during exposure, pictures without distortion, and renders distant subjects as sharply as those in the foreground.

In using the pinhole camera it will be found a slight inconvenience that it is not suitable for focussing the picture before the exposure, and that consequently the time of exposure must be guessed more

or less. It is true there would be no difficulty at all to arrange the camera so that a ground glass could be inserted in place of the dark slide for the purpose of focussing; but if a pinhole is used, the diameter of which varies between 3/10 and 7/10 millimetres with a focal length which is not *very* short, it will be almost impossible to perceive the image projected on the ground glass. In order to ascertain as nearly as possible the correct exposure, it is therefore necessary to know the intensity of the light, the distance of the sensitive plate from the opening, the exact diameter of the opening, and the degree of sensitiveness of the film employed. The calculation of the time of exposure is greatly assisted by means of the table compiled by M. Léon Vidal, which is reproduced elsewhere.

This very reliable table shows that in the case of a focal length of respectively 5, 6, 7, 8, 9 and 10 centimetres,

of an opening of $\frac{3}{10}$ of a millimetre diameter, and by using highly sensitive films, an exposure of respectively 5, 7, 10, 13, 16, and 20 seconds in bright sunlight will be sufficient. The photographs obtained with this opening vary in size from 8 by 8 to 15 by 15 centimetres; the former size corresponding to a focal length of five centimetres, the latter size to one of ten centimetres. In the case of a slightly overcast sky (about one half of the intensity of light at bright sunlight) the exposure under the circumstances mentioned would amount to respectively 10, 14, 20, 28, and 32 seconds, and in the case of dull weather (about $\frac{1}{10}$ of the intensity of light at bright sunlight) to respectively 40s., 1m. 10s., 1m. 40s., 1m. 50s., and 2m. 40s.

Long focal lengths, and corresponding large sizes of the sensitive plate, require comparatively long exposures, while in using small sizes and short distances

FIG. 38.—PHOTOGRAPH TAKEN WITH A PINHOLE CAMERA.

between plate and opening, a very short exposure will generally be sufficient. If the focal length is restrained to 4 to 5 millimetres, it will be possible to take photographs in from $\frac{1}{10}$ to $\frac{1}{5}$ second. In

such cases, working in the open air, it is not possible to dispense with a mechanical shutter.

As regards the construction of the apparatus, a very simple and inexpensive arrangement is sufficient. A common cigar-box, provided it be rendered quite light-tight by means of black paper or black velvet pasted inside, makes an admirable camera. It may be constructed so that the back side, where the sensitive plate is inserted, is hinged, or that it slides in grooves, so as to take it out and to provide it with the plate in the dark room, but care must be taken that it shuts entirely light-tight. The plate may be fixed either by pins or in grooves.

Instead of gelatine plates, bromide of silver emulsion paper (negative paper) may be used advantageously with the pinhole camera, since the latter does not require so much detail as albumen paper. This paper is best mounted with its

edges to the back of the pinhole camera. At all events it should lie quite evenly.

The front side of the camera contains in its centre a small square aperture, over which a very thin blackened metal plate or a piece of black paper is attached, containing in its centre the pinhole, which serves as a lens. The pinhole should be absolutely round and provided with sharp edges. If black paper is used, the pinhole should be pricked in it with the point of a red-hot sharp needle. (No. 8.) A tiny hole may as well be punctured with the needle in an ordinary visiting card, which must be well blackened before. The perforated paper, card, or metal is then attached over the larger aperture in the front side by means of strips of stamp paper round the edges. The aperture of the pinhole depends on its distance from the sensitive plate. With a distance of 30 centimetres the best results will be obtained with an aperture of $\frac{1}{2}$ milli-

metre. With a distance of 8 centimetres the aperture should be $\frac{3}{10}$ millimetre in diameter; it should, however, not be larger than 5 millimetres, and not smaller than $\frac{1}{4}$ millimetre.

The distance between the pinhole and the sensitive film, *i.e.*, the focal length, may be calculated by means of the table by M. Léon Vidal (pages 106 and 107). The shorter the distance, the sharper will be the picture. If no tripod stand is used, the camera is best placed on a wall, window sill, etc. Care should, however, be taken that it is not moved during exposure.

Also, stereoscopic pictures may be taken with the pinhole camera; for this purpose it is only necessary to provide the front of the camera with two pinholes, and to insert a blackened division inside the camera, to divide it vertically into two partitions. The two pinholes, which must be equally large, are placed

## TIME OF EXPOSURE IN PHOTOGRAPHING WITHOUT A LENS.

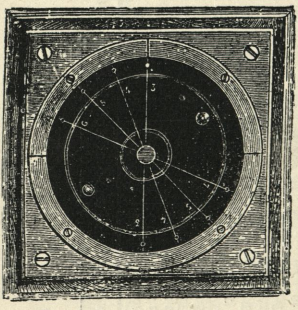
| *Apertures in fractions of a millimetre* | *Focal length in centimetres.* | *Time of exposure for various intensities of light, as indicated by Léon Vidal's photometer.* | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 10*) | | 9 | | 8 | | 7 | | 6 | | 5 | | 4 | | 3 | | 2 | | 1*) | |
| | | M. | S. | M. | S. | M. | S. | M. | S. | M. | S. | M. | S. | M. | S. | M. | S. | M. | S. | M. | S. |
| | 5 cent. | ,, | 5 | ,, | 5½ | ,, | 6 | ,, | 7 | ,, | 8 | ,, | 10 | ,, | 12 | ,, | 16 | ,, | 25 | ,, | 40 |
| | 6 — | ,, | 7 | ,, | 8 | ,, | 9 | ,, | 11 | ,, | 12 | ,, | 14 | ,, | 16 | ,, | 20 | ,, | 35 | 1 | 10 |
| | 7 — | ,, | 10 | ,, | 12 | ,, | 15 | ,, | 16 | ,, | 18 | ,, | 20 | ,, | 25 | ,, | 30 | ,, | 50 | 1 | 40 |
| | 8 — | ,, | 13 | ,, | 15 | ,, | 18 | ,, | 22 | ,, | 24 | ,, | 28 | ,, | 35 | ,, | 45 | ,, | 60 | 1 | 50 |
| | 9 — | ,, | 16 | ,, | 18 | ,, | 20 | ,, | 26 | ,, | 28 | ,, | 32 | ,, | 47 | 1 | ,, | 1 | 20 | 2 | 40 |
| 2/10 mm. | 10 — | ,, | 20 | ,, | 22 | ,, | 25 | ,, | 29 | ,, | 33 | ,, | 40 | ,, | 50 | 1 | 6 | 1 | 40 | 3 | 20 |
| | 11 — | ,, | 24 | ,, | 26 | ,, | 30 | ,, | 34 | ,, | 39 | ,, | 48 | 1 | ,, | 1 | 19 | 2 | ,, | 4 | ,, |
| | 12 — | ,, | 29 | ,, | 32 | ,, | 36 | ,, | 41 | ,, | 48 | ,, | 58 | 1 | 12 | 1 | 36 | 2 | 25 | 4 | 50 |
| | 13 — | ,, | 34 | ,, | 37 | ,, | 42 | ,, | 48 | ,, | 56 | 1 | 8 | 1 | 25 | 1 | 53 | 2 | 50 | 5 | 40 |
| | 14 — | ,, | 39 | ,, | 43 | ,, | 48 | ,, | 55 | 1 | 4 | 1 | 18 | 1 | 37 | 2 | 9 | 3 | 15 | 6 | 30 |
| | 15 — | ,, | 45 | ,, | 49 | ,, | 56 | 1 | 3 | 1 | 14 | 1 | 30 | 1 | 52 | 2 | 29 | 3 | 45 | 7 | 30 |
| | 16 — | ,, | 52 | ,, | 57 | 1 | 5 | 1 | 13 | 1 | 26 | 1 | 42 | 2 | 10 | 2 | 53 | 4 | 20 | 8 | 40 |
| | 18 — | 1 | 5 | 1 | 11 | 1 | 21 | 1 | 32 | 1 | 47 | 2 | 10 | 2 | 42 | 3 | 36 | 5 | 25 | 10 | 50 |
| | 20 — | 1 | 2 | 1 | 8 | 1 | 17 | 1 | 28 | 1 | 52 | 2 | 4 | 2 | 35 | 3 | 26 | 5 | 10 | 10 | 20 |
| 1/10 mm. | 22 — | 1 | 15 | 1 | 22 | 1 | 33 | 1 | 46 | 2 | 4 | 2 | 30 | 3 | 7 | 4 | 9 | 6 | 15 | 12 | 30 |
| | 24 — | 1 | 30 | 1 | 40 | 1 | 52 | 2 | 7 | 2 | 29 | 3 | ,, | 3 | 45 | 5 | ,, | 7 | 30 | 15 | ,, |
| | 26 — | 1 | 45 | 1 | 55 | 2 | 11 | 2 | 29 | 2 | 54 | 3 | 30 | 4 | 22 | 5 | 49 | 8 | 45 | 17 | 30 |
| | 28 — | 2 | 2 | 2 | 14 | 2 | 32 | 2 | 53 | 3 | 24 | 4 | 4 | 5 | 5 | 6 | 46 | 10 | 10 | 20 | 20 |
| | 30 — | 1 | 52 | 2 | 3 | 2 | 20 | 2 | 39 | 3 | 5 | 3 | 44 | 4 | 40 | 6 | 12 | 9 | 20 | 18 | 40 |
| 5/10 mm. | 32 — | 2 | 8 | 2 | 20 | 2 | 40 | 3 | ,, | 3 | 32 | 4 | 16 | 5 | 20 | 7 | 6 | 10 | 40 | 21 | 20 |
| | 34 — | 2 | 24 | 2 | 38 | 3 | ,, | 3 | 24 | 4 | ,, | 4 | 48 | 6 | ,, | 8 | ,, | 12 | ,, | 24 | ,, |

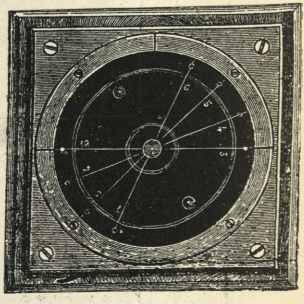
*) 10 corresponds to bright sunlight; 1 corresponds to an intensity of one-tenth of that standard. If highly sensitive plates are used the indications of the columns 10, 9, 8, 7, and 6 may be reduced to one half.

| *Apertures, infractions of a millimetre* | *Focal length in centimetres* | *Time of exposure for various intensities, as indicated by M. Léon Vidal's photometre.* | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 10*) | | 9 | | 8 | | 7 | | 6 | | 5 | | 4 | | 3 | | 2 | | 1*) | |
| | | M. | S. | M. | S. | M. | S. | M. | S. | M. | S. | M. | S. | M. | S. | M. | S. | M. | S. | M. | S. |
| $\frac{5}{10}$ mm. | 36 cent. | 2 | 42 | 3 | ,, | 3 | 22 | 3 | 50 | 4 | 28 | 5 | 24 | 6 | 45 | 9 | ,, | 13 | 30 | 27 | ,, |
| | 38 — | 3 | ,, | 3 | 18 | 3 | 42 | 4 | 15 | 4 | 58 | 6 | ,, | 7 | 30 | 10 | ,, | 15 | ,, | 30 | ,, |
| | 40 — | 3 | 20 | 3 | 40 | 4 | 10 | 4 | 44 | 5 | 32 | 6 | 40 | 8 | 20 | 11 | 6 | 16 | 30 | 33 | ,, |
| | 42 — | 3 | 40 | 4 | 20 | 4 | 35 | 5 | 12 | 6 | 6 | 7 | 20 | 9 | 10 | 12 | 12 | 18 | ,, | 36 | ,, |
| | 44 — | 3 | 20 | 3 | 40 | 4 | 10 | 4 | 44 | 5 | 32 | 6 | 40 | 8 | 20 | 11 | 6 | 16 | 30 | 33 | ,, |
| $\frac{6}{10}$ mm. | 46 — | 3 | 38 | 4 | ,, | 4 | 32 | 5 | 9 | 6 | ,, | 7 | 16 | 9 | 5 | 12 | 5 | 18 | 10 | 36 | 20 |
| | 48 — | 4 | ,, | 4 | 24 | 5 | ,, | 5 | 40 | 6 | 38 | 8 | ,, | 10 | ,, | 13 | 19 | 20 | ,, | 40 | ,, |
| | 50 — | 4 | 24 | 4 | 50 | 5 | 30 | 6 | 14 | 7 | 18 | 8 | 48 | 11 | ,, | 14 | 39 | 22 | ,, | 44 | ,, |
| | 52 — | 4 | 37 | 5 | ,, | 5 | 46 | 6 | 33 | 7 | 39 | 9 | 14 | 11 | 32 | 15 | 22 | 23 | 5 | 46 | 10 |
| | 54 — | 5 | ,, | 5 | 30 | 6 | 15 | 7 | 6 | 8 | 18 | 10 | ,, | 12 | 30 | 16 | 39 | 25 | ,, | 50 | ,, |
| | 56 — | 5 | 17 | 5 | 48 | 6 | 36 | 7 | 30 | 8 | 46 | 10 | 34 | 13 | 12 | 17 | 35 | 26 | 30 | 53 | ,, |
| | 58 — | 5 | 50 | 6 | 25 | 7 | 17 | 8 | 17 | 9 | 41 | 11 | 40 | 14 | 35 | 19 | 25 | 29 | 10 | 58 | 20 |
| $\frac{7}{10}$ mm. | 60 — | 5 | 20 | 5 | 52 | 6 | 40 | 7 | 30 | 8 | 51 | 10 | 40 | 13 | 20 | 17 | 45 | 26 | 20 | 53 | 20 |
| | 62 — | 5 | 42 | 6 | 16 | 7 | 7 | 8 | 5 | 9 | 27 | 11 | 24 | 14 | 15 | 19 | ,, | 28 | 30 | 57 | ,, |
| | 65 — | 6 | 16 | 6 | 53 | 7 | 50 | 8 | 53 | 10 | 24 | 12 | 32 | 15 | 40 | 20 | 52 | 31 | ,, | 1 St. 2 | M. |
| | 68 — | 7 | ,, | 7 | 42 | 8 | 45 | 9 | 56 | 11 | 37 | 14 | ,, | 17 | 30 | 23 | 18 | 35 | ,, | 1 ,, 10 | ,, |
| | 71 — | 7 | 25 | 8 | 9 | 9 | 16 | 10 | 31 | 12 | 29 | 14 | 50 | 18 | 22 | 24 | 41 | 37 | ,, | 1 ,, 14 | ,, |
| | 74 — | 8 | ,, | 8 | 48 | 10 | ,, | 11 | 21 | 13 | 16 | 16 | ,, | 20 | ,, | 26 | 38 | 40 | ,, | 1 ,, 20 | ,, |
| | 77 — | 8 | 44 | 9 | 36 | 11 | ,, | 12 | 24 | 14 | 29 | 17 | 28 | 21 | 30 | 28 | 44 | 43 | ,, | 1 ,, 27 | ,, |
| | 80 — | 9 | 30 | 10 | 27 | 11 | 52 | 13 | 29 | 15 | 46 | 19 | ,, | 24 | ,, | 31 | 38 | 48 | ,, | 1 ,, 35 | ,, |

* 10 corresponds to bright sunlight; 1 corresponds to an intensity of one-tenth of that standard. If highly sensitive plates are used, the indications of the columns 10, 9, 8, 7, and 6 may be reduced to one half.

on a horizontal plane, at a distance of about 6·5 centimetres from each other, this corresponding to the average distance of the axis of the two human eyes.





FIGS. 39 AND 40.—REVOLVING DIAPHRAGM PLATES FOR PINHOLE CAMERAS.

Position for taking single Photographs.

Position for taking Stereoscopic Pictures.

The subject of photography without a lens has received much attention latterly, from the French photographic world especially. In the catalogue of one Parisian dealer an apparatus is illustrated, consisting of a revolving diaphragm plate, pierced with minute apertures of various sizes, to be used as occasion requires (see figs. 39 and 40). The

diameter of the apertures varies from 0·3 to 1·5 millimetres. The revolving diaphragm plate, made of metal, is fixed to the front of the pinhole camera; by turning it by means of small buttons fastened on it, any of the various pin-

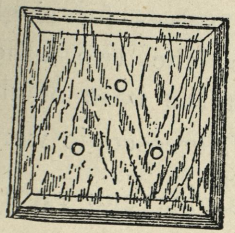


FIG. 41.—CAMERA FRONT, AS SEEN FROM OUTSIDE.

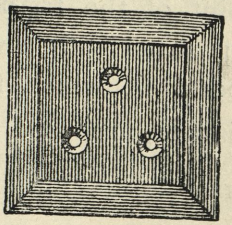


FIG. 42.—THE SAME, AS SEEN FROM INSIDE.

holes can be brought in front of a corresponding aperture provided in the front of the camera. If single landscape photographs are to be taken exclusively, a single aperture in the camera front is sufficient; if, however, stereoscopic pictures are also to be taken with it, a camera front must be used, which is

provided with three apertures, arranged in the form of an acute-angled triangle (see figs. 41 and 42). These apertures should be of a conical form, with the base (the broader end) inside the camera front. The upper aperture, forming the point of the triangle, serves for single exposures only, whilst the two other apertures, which form the base of the triangle, are used for stereoscopic work.

### THE PRODUCTION OF CARICATURE PHOTOGRAPHS BY MEANS OF THE PINHOLE CAMERA.

A well-known French photographer has found another method of applying the system of photography without a lens. It is described by M. Léon Vidal as follows: In place of a circular opening two slits are used. These slits are arranged so that they may lie across one another, either at a right angle, or at a more or less acute angle, enabling the

operator to obtain very odd effects, caricatures such as have been described on pages 59 to 63.

The disposition of the apparatus is very simple. It consists of a rectangular box furnished with grooves, into which are slid, one near the other, two plates bearing slits, and a transparency is placed at the other end of the box. According as the double system of slits is arranged; very diverse caricatures are obtained. To these results M. Ducos du Hauron gives the name of "transformation by photography." The arrangement of the apparatus is clearly shown by the sketch, fig. 43.

A is the front of the box, which is furnished with an exposure shutter formed of a simple sliding piece fitting into the grooves R R, R R. B B" are two screens, pierced with slits a a, c c. C is the rear end of the box where the dark slide is placed. D is the lid of the

box, which is lifted either for placing the slotted screens or for putting in the sensitive plate. When not working direct from nature, the transparency is placed in the grooves R R, R R, at A.

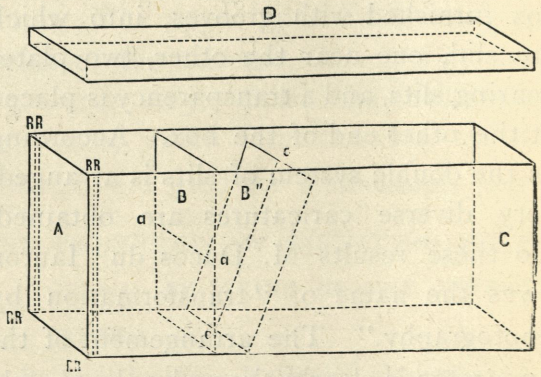



FIG. 43.—PINHOLE CAMERA FOR THE PRODUCTION OF CARICATURES.

According to the arrangement of the slits, the caricatures obtained will be different. If, for instance, the first slit be a vertical one, and the other, *i.e.*, the one nearest the picture, a horizontal one, the picture, in comparison to the original,

will be distorted lengthwise. If, however, one of the slits forms no straight line, but a curved one, the transformed picture will show either lengthwise or sideways curved lines, according to the slit being a vertical or a horizontal one. The form of the resulting picture will also be different according to which one of the slotted plates is inserted more or less obliquely in the box.

The slits must be made very exactly; above all, their edges must be absolutely sharp, every incorrectness being transferred to the picture. They may be made about one-third of a millimetre wide; if they are too narrow the picture will not turn out sharp. In making the slits it is a good plan to cut them in thin black paper, and to mount the latter on glass plates. (38.)

### PHOTOGRAPHS TAKEN WITH A SPECTACLE LENS.

In case of forgetting one's usual lens when out on a tour, it may even be worth

while to make the exposure with a spectacle lens of suitable focus. Dr. A. P. Reed, in 1885, took a landscape photograph, of the size of 13 x 21 centimetres, with this very cheap objective, and the print was published as a supplement in the *Photographic News*. He used a plano-convex of 9in. focus, and the exposure given was forty seconds, with $\frac{f}{90}$, and with a very slow brand of plate. The negative was of fair density, and came up well with pyro and ammonia. The plane surface of the lens was put in front, and the convex side towards the ground glass. (39.)

### THE CAMERA COMBINED WITH THE TELESCOPE.

Some operators, by combining the camera with the telescope, have succeeded in satisfactorily photographing terrestrial objects situated at considerable distances. The arrangement adopted is

virtually a telescope so placed in front of the camera that the lens of the camera looks into the telescope just as the eye of an observer would look into the instrument.

A French photographer, M. Lacombe, used a telescope which magnified about 15 diameters; it was kept in its place by means of an adapter A (fig. 44), which screwed into the mount of the objective at B. At C was a diaphragm of large aperture. As objective he employed a Darlot's combination series, which consisted of four glasses varying from 25 to 35 centimetres focus, and with regard to the general success of the work, it made but little difference which of these was used.

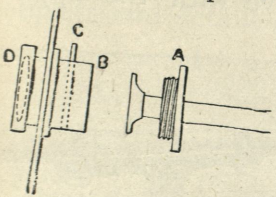


FIG. 44.

The size of the image depends on the extent to which the camera is extended,

and the focussing is managed by adjusting the distance between the eyepiece and the objective of the telescope (fig. 45). To facilitate the focussing, the telescope may be combine with a rack and pinion arrangement. It seems not to be absolutely necessary to employ a photographic objective with the appar-

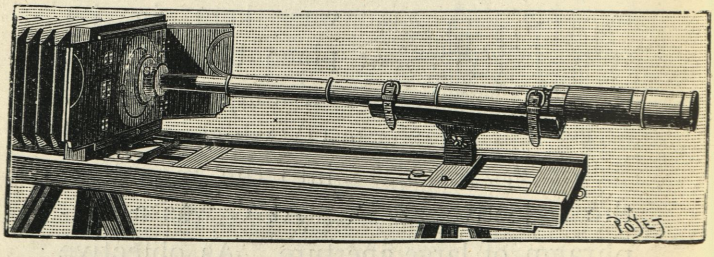


FIG. 45.—CAMERA COMBINED WITH THE TELESCOPE, ACCORDING TO M. LACOMBE.

atus; at least, M. Lacombe asserts that he obtained pictures, though rather thin ones, also without it. An absolutely achromatic telescope, without chemical focus, is sufficient. The latter causes a lack of sharpness, which is, however, very

seldom to be entirely avoided on account of the prevailing haze, which interferes with the prospective view. But in spite of this, it is probable that this apparatus may be of considerable service for certain purposes, since the photographs obtained with it disclose numerous objects and details altogether invisible to the unassisted eye.

E. Mathieu, another French amateur photographer, proceeds similarly. After focussing the photographic apparatus he brings the telescope near the objective of the camera, and combines it with the latter by wrapping round it a black cloth.

Fig. 46 shows the mode of hanging the telescope, as it is employed by E. Mathieu in the interior of a room. The horizontal direction of the instrument is easily obtained by it. The telescope is suspended by a very fine brass wire, which, for obtaining its vertical direction, is wound on movable iron bars.

Mathieu works with a telescope which may be extended up to 60 centimetres focus. In this way a photograph has been taken of the castle "La Fléchère," at a distance of 1,200 metres. There are two conditions which are above all

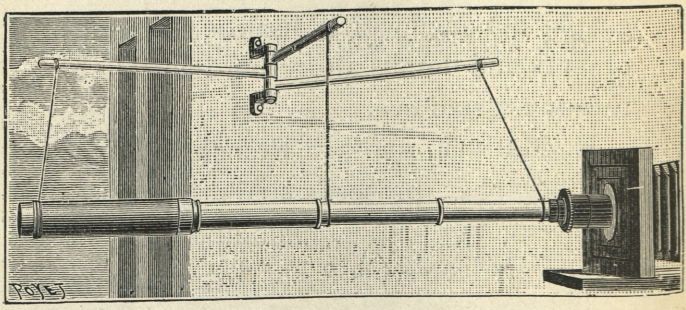


FIG. 46.—CAMERA WITH TELESCOPE, ACCORDING TO E. MATHIEU.

to be observed in taking photographs of this kind: 1. Not the slightest ray of light should enter between the telescope and the objective of the camera. 2. The time of exposure should be correctly estimated. With a camera for plates of the size 13 x 18 centimetres, and

with a Darlot hemispheric lens No. 2, a photograph of the above-mentioned castle was taken by Mathieu, at first without the use of the telescope, with an aperture of two millimetres diameter; the exposure was five seconds. From the same standpoint, and under the same conditions of light, the castle was then photographed by the aid of the telescope, and in this case the exposure was ninety seconds. The gelatine plates used were of average sensitiveness.

Mr. Mathieu asserts that he has taken photographs by means of the apparatus here described, even at the distance of 6,000 metres, with some success. (35.)

### THE VEST CAMERA, THE CAMERA IN THE HAT, AND AS A WATCH.

A few curious forms of cameras of the detective type may be shortly mentioned here. Some years ago the "vest camera" was introduced into the market in America.

It consisted of a special false vest, made of stiff leather material, which was put over the ordinary vest. On the inside of the false vest was a pocket which supported the camera proper. Suitable

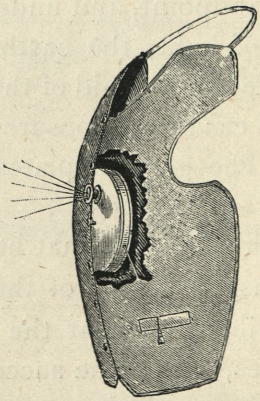


FIG. 47.—VEST CAMERA.

openings for a spindle and its knob, and a lens tube to project through, were arranged on the front of the vest. To operate the camera, the string hanging slightly below the bottom of the vest, in the vest pocket, was pulled, in order to

release the shutter of the camera, and to make the exposure without attracting the attention of anyone. The circular camera case contained the sensitive plate, which was cut in the shape of an octagon, each plate receiving light impressions. Since that time this camera has been offered to the photographic world in a simplified and improved form, under the name of "Stirn's Detective Camera."

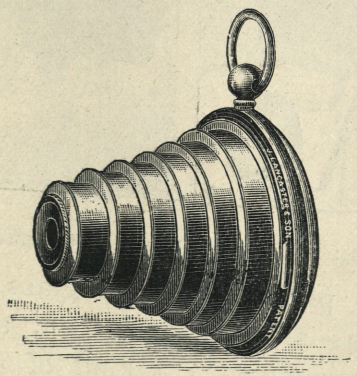
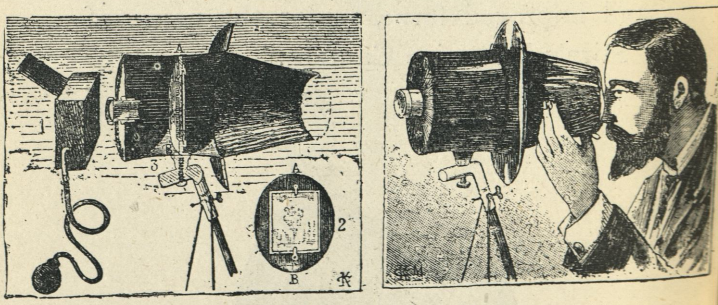


FIG. 48.—THE WATCH CAMERA.

"The watch" (fig. 48), when closed, is exactly like an ordinary watch, and is

opened in an instant by pressing a spring. The exposure is, of course, an instantaneous one, worked by a spring.

Finally, the "hat camera" (fig. 49), in the form in which it is here illustrated, has been constructed by Mr. Léon Dumuys. The frame inside the hat




FIGS. 49 AND 50.—THE HAT CAMERA.

takes a plate of ground glass, which serves as a focussing screen, and the maker recommends a kind of portfolio slide containing sensitive films. The objective projects through the centre of the cover of the hat, and, if not in use,

this opening is shut by a conical button. The walking-stick, to which two thin iron rods are attached, serves as a tripod stand. If an instantaneous shutter is required, this may be made of the form shown in fig. 49, No. 1, which can be readily carried in the pocket of the coat. (36.)

# CHAPTER IV.

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# PHOTOGRAPHIC—OPTICAL ENTERTAINMENTS

## CHAPTER IV.

### STROBOSCOPIC PICTURES.

The well-known "Stroboscopic disc," invented in 1832 by Stampfer, consists simply of a pasteboard disc of about 20 to 30 centimetres in diameter, which is separated by a circle into an inner disc of about 15 to 25 centimetres in diameter, and an outer ring 5 centimetres broad. Upon the inner disc are described 8 to 12 figures close to the periphery, at equal distances from one another, and from the middle point of the circle; these figures represent the phases of a periodically returning and receding motion, in which, of course, it is conditional that they always preserve the corresponding position to the centre, and to the periphery. The outer ring is broken on its sides by 8 to 12 slits, each of which is joined to one of the pictures. The whole disc

rotates fast on an axis, while it is held perpendicularly before a person by the handle, so that the picture side is turned towards a looking-glass, and the picture can be seen in this through one of the slits. Unless they change their place, the periodical motion cannot be seen. The pictures then give the impression of a real motion.

To produce such pictures for the Stroboscopic disc, the photographic camera may be utilised with much success. The following is a description of the process:

In the Stroboscopic disc we see a subject respectively six, seven, eight or nine times, according to the arrangement selected; the number of the pictures is therefore a gratuitous one, and each of these pictures must be taken from a different standpoint or at different phases of the motion. It is therefore necessary to take of a subject of which a Stro-

boscopic picture is desired as many photographs as will be required by the arrangement which has been chosen, and each photograph from a different point of view or at a different phase of motion.

Suppose you have made the arrangement for nine pictures, how are these produced in the quickest and most convenient manner? In the case of rapid or very short motions, as, for instance, striking with a hammer, blinking with the eyes, opening the mouth, drinking, &c., only two or three photographs are necessary, but from each negative respectively three, four, or five prints are to be taken. These prints are then mounted on a pasteboard disc (the size of which depends on the size and on the number of the pictures), so that the different pictures are arranged alternatively thus: 1, 2, 1, 2, 1, 2, &c. (see fig. 52). With this arrangement the pictures will show rapid motions; they may be rendered slower by arranging

them thus: 1, 1, 2, 2, 1, 1, 2, 2; or 1, 1, 1, 2, 2, 2, 3, 3, 3.

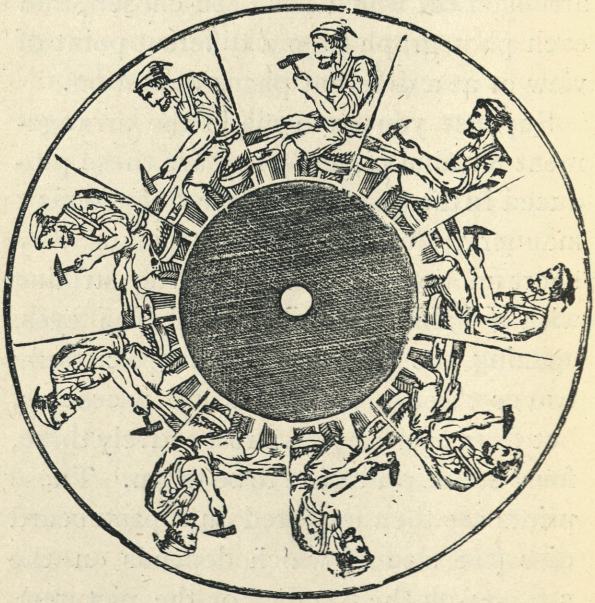
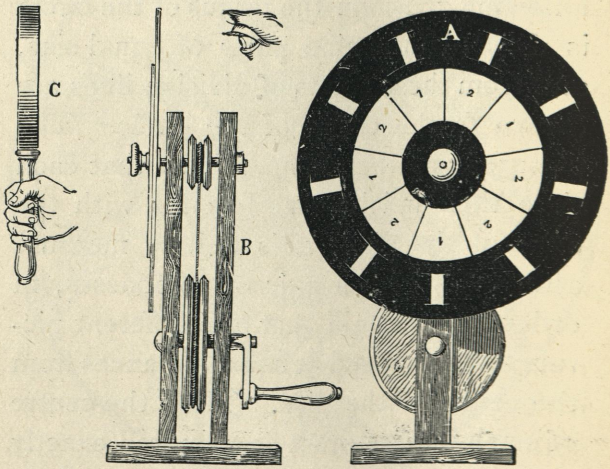


FIG. 52.—ARRANGEMENT OF THE STROBOSCOPIC PICTURES.

As regards mounting the prints, this is a somewhat difficult operation. The parts of each picture which are to maintain the condition of the eyes should be

arranged at equal distances from each other and from the axis of the turning point. To render this possible, small discs of cardboard of the required sizes should be cut, and provided with the following division : the radius of the circle is divided into nine parts of equal size, and from these points of division lines are drawn to the centre of the circle. The pictures are then mounted, so that each time their height exactly ends with the edge of the disc ; it is well to measure afterwards with a pair of compasses, in order to ascertain that the different pictures are arranged at equal distances from the centre of the disc. Then the centre of each picture must be mounted exactly on one of the lines by which the circle is divided into nine parts. Unless these rules are observed in mounting a general blurring will be produced, and there will consequently be a want of clearness in the pictures when showing them.

As to the apparatus, an ordinary Stroboscopic disc is sufficient for looking at these pictures (figs. 53 and 54). In front of the disc A (fig. 54), the pasteboard disc, on which the prints have been mounted,



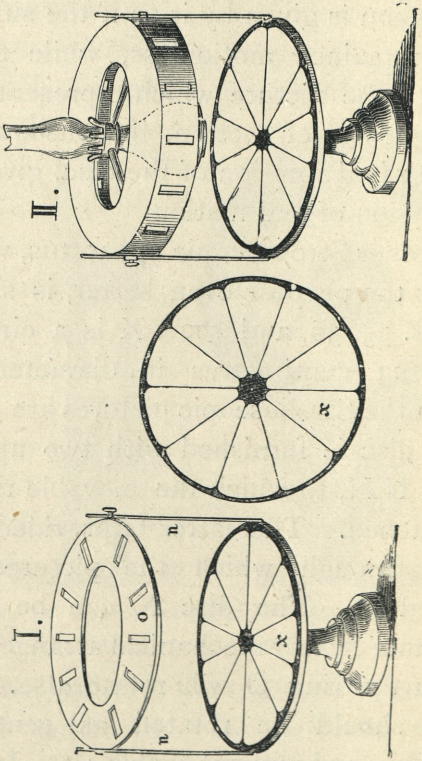

FIGS. 53 AND 54.—STROBOSCOPIC APPARATUS. SIDE VIEW AND SECTION.

is placed, which is then rotated by means of the handle B. If one looks then through the disc A at the mirror C, rotating the disc at the same time by

means of the handle, the pictures will be perceived in rapid succession, and the impression is given by it as if the subject itself remained motionless, while those parts of the picture which represent the phenomenon of motion, in consequence of the rapid rotation of the disc, give the impression of real motion.

Another Stroboscopic apparatus, which serves the purpose even better, is shown in figs. 55, 56, and 57. X is a circular disc, 23 centimetres in diameter, on which the Stroboscopic pictures are fixed. This disc is furnished with two upright rods, N N, to which the movable ring O is fastened. The latter is provided with slits, through which the pictures are looked at. The disc X can be made to rotate by any mechanical arrangement, when the ring O will rotate also. The disc should be rotated as gently as possible, and without shaking it. In daytime the light enters laterally, in the

evening a lamp is inserted, as shown in fig. 57. The lamp-shade is made of




FIGS. 55 to 57.—ANOTHER STROBOSCOPIC APPARATUS.

metal, so that it may be used at the same time as a reflector

In the apparatus combined with the lamp (fig. 57), the ring with the slits is placed perpendicularly; here one does not look directly at the picture, but at small looking-glasses arranged behind it. Accordingly, one perceives here only one picture, while with the apparatus shown in fig. 55 the whole series of pictures on the disc can be seen.

With regard to the photographs, they should be taken as sharply and carefully as possible, and it is well to look for contrasts. Dark draperies and heads with dark hair should be taken with a light background, whilst light subjects are taken before a dark background. The prints should be made rather light, but distinct; in the case of pictures on a dark ground, the pasteboard disc must be also of dark colour, whilst it should be of light colour in the case of pictures on a light ground. The best effects are perhaps produced by photographs showing the

figure and the face motionless, and only the arms, the hands, the eyes, the mouth, etc., representing the phenomenon of motion.

As regards the size of the pictures, they may be made about five centimetres high and four centimetres wide; in this case, and if an arrangement of nine pictures has been chosen, the whole diameter of the disc will be about 15 centimetres. (37.)

### KALEIDOSCOPIC PHOTOGRAPHY.

The beautiful and varied forms and shapes presented to the eye by the kaleidoscope may be permanently recorded by photography. Such photographs would not only be of great beauty, but also a great help to all those traders who are interested in novelty and design. To reproduce them directly in the camera, the following method may be adopted: A quarter-plate camera may

be employed, with its lens. In the groove of the frame a thick board is fixed, with a hole in the centre, into which the kaleidoscope is introduced. The small aperture of this instrument, through

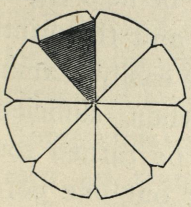
FIG. 58.—KALEIDOSCOPIC PICTURE.

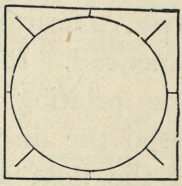
which the images are viewed, is in the interior of the camera, and the axis of the instrument placed exactly on the prolongation of the objective; this

latter is inserted in the flange in the front of a camera of long focus and fixed in that position. The whole is then placed on an inclined plane, so that the light from the sky directly illuminates the objects reflected in the mirror of the kaleidoscope. Instead of turning the instrument to produce the different arrangements, it is easier to apply some plain glasses upon which some fanciful objects have been previously fastened. The regular figures which result are depicted on the ground glass of the camera of long focus, and the images are focussed direct without being reflected. This portion is, of course, more lighted than the others. A full exposure should be given.

Another method, which gives a finer result, though it is perhaps rather more troublesome, consists in the following: The negative of the subject should be taken on a transparent negative film, as

it has to be printed from on both sides. Take a piece of thin black paper, and having drawn a circle on it, divide it into 8, 12, 16, or as many equal segments as required; then cut out one of these segments, and mount the negative with a little gum to the opening. The appearance of the circle will be as in fig. 59.





FIGS. 59 AND 60.—ARRANGEMENTS FOR PRINTING KALEIDOSCOPIC PICTURES.

The notches at each division are for the purpose of allowing the lines on the sensitised paper to be seen and registered. Now take a piece of sensitised paper, and mark with the compasses in the same manner, but merely at the edges, as in fig. 60.

Now take a piece of board covered with flannel and lay the sensitised paper on it, and place the disc holding the negative over it, putting a pin through the two centres. The lines on the sensitised paper are then brought to correspond with the notches in the disc, and a piece of glass being laid over the one half, the whole may be held together by two American clips and the printing commenced. It may be easily examined during printing, and when sufficiently exposed the disc must be turned round until the next segment but one corresponds with the negative, and so on until the four are done ; the pin must then be taken out and the disc reversed, and the alternate spaces printed on.

The result will be a pretty kaleidoscopic picture, and which may be varied considerably from the same negative by altering its position in the opening. A group of flowers, or single flower, a bit of

moulding—in fact, almost anything—will produce a beautiful design. (38.)

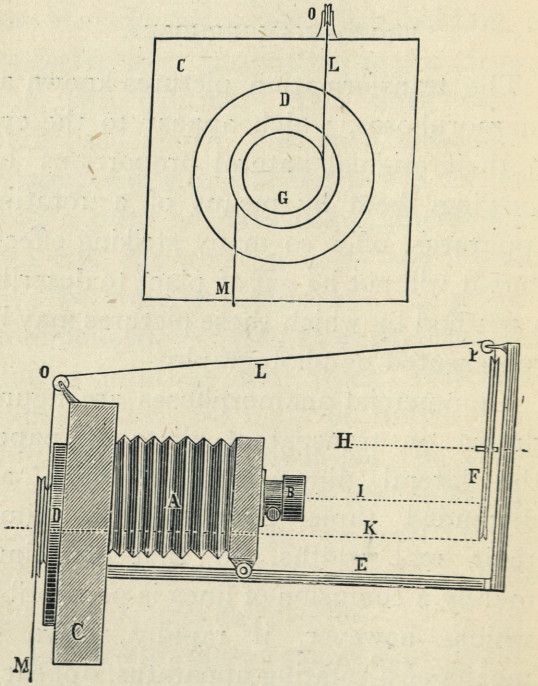
## PHOTO-ANAMORPHOSES.

The transformation pictures known as anamorphoses, which appear to the eye in their original natural proportions by showing them by means of a rotating apparatus, offer so many striking effects that it will not be out of place to describe a method by which these pictures may be represented by photography.

Commercial anamorphoses are figures drawn on transparent discs of paper, the lateral dimensions of which are distended three, four, or five times their real widths, so that oftentimes merely a confusion of lines is perceptible, which, however, if rapidly shown by means of a rotating apparatus, appear to the eye as pictures of correct dimensions.

To produce such pictures by the aid of photography, a specially constructed camera is required, the dark slide of

which is combined with a rotating disc by means of a strap and wheel.




FIGS. 61 AND 62.—APPARATUS FOR PRODUCING PHOTO-ANAMORPHOSES.

Fig. 62 shows the photographic camera combined w th the rotating disc, to which

the photograph to be taken is fixed; A is the camera, B the lens, C the back of the camera, to which the revolving dark slide D is fastened, E the baseboard of the camera, F the rotating disc.

The dotted line H shows the axial direction of the rotating disc; the dotted line I the axial direction of the lens; the dotted line K the axial direction of the revolving dark slide.

To the dark slide D a double pulley is fixed with grooves, the latter being made for the two cords L and M. The cord L passes over the two small pulleys O and P to the revolving disc F, in the lateral grooves of which it is embedded, turning by this manner each time the revolving disc together with the dark slide. The cord M passes to the shaft of a stout clockwork, by which an uniform rotation is given to the dark slide.

The transmission of the motion of the dark slide to the revolving disc should be

arranged so that when the dark slide has turned once around its axis, the revolving disc should have moved for only 60 to 90 degrees of the periphery of a circle in the opposite direction.

The anamorphosic picture is fixed on the revolving disc at F, exactly on a level with the axial direction of the lens.

The sensitive plate is exposed through a slit of about 10 millimetres in diameter, behind which the dark slide, as in the case of a panoramic camera, is sliding during exposure. Fig. 60 shows a section through the back of the camera ; C is the back of the camera, D the dark slide, G the double pulley for the cords L and M.

The negatives obtained with this apparatus are printed best on salted paper, which in sensitising is entirely immersed in the bath, in order to obtain vigorous prints when looked at by transmitted light. The finished print is then rendered transparent by a wax solution.

The showing of such photo-anamorphosic pictures is done in the same way as in the case of the commercial anamorphosic pictures. The print is fastened to a revolving apparatus, and opposite, on a level with it, a black disc is placed, which is provided with a number of slits perpendicular to its axis.

Such revolving apparatus being ordinary articles of commerce, a description of them may be omitted; the main point consists of the arrangement that one axis of the apparatus revolves about four times as quick as the other one. To this axis the picture is fastened, to the slower revolving one the black disc with the slits. The axes, and with them the two discs, being thus rotated, the picture is seen through the perforated disc in its correct dimensions, which were not to be deciphered previously. In consequence of the picture being rotated four times as quick, it is contracted four times, return-

ing, therefore, to its normal proportions, on account of the fact that it was previously distended four times in its lateral dimensions.

Portraits of well known persons, and funny pictures, are perhaps suited best for being shown with this apparatus. Any other shape may be given to these photo-anamorphoses; generally, however, they will look best in the form of a circle or of a disc, as described above. (39.)

### THE PHOTO-CHROMOSCOPE.

The photo-chromoscope is a source of endless enjoyment for winter evenings, family parties, &c. It adds nature's tints to any photograph on glass. M. Jabez Francis gives the following description of the construction of the apparatus:

A is a rectangular box of mahogany fifteen inches high in front, thirteen inches at back, seven inches wide, and six inches from front to back; B is a silvered reflector (common looking-glass) placed at an angle

of 45°, or it may be mounted on a rod, with knob projecting as marked, when the angle can be varied. The glass should be six inches wide.

C, the drum, is made thus: Take two pieces of mahogany three-eighths of an inch thick and five inches in diameter.

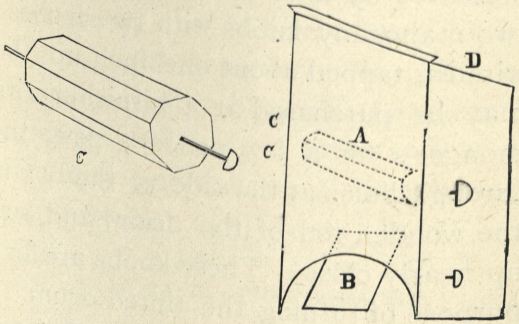



FIG. 63.—THE PHOTO-CHROMOSCOPE.

Pierce a half-inch hole in the centre, and from this strike an octagon, cut to shape, and fix one on either end of a half-inch wooden rod six inches long, having a small hole drilled up, say, one inch. Take strips of coloured glass or gelatine

—yellow, blue, mauve, rose tint, green, gold, red, and light blue—and cut about three-quarters of an inch wide, and glue them on the drum ends longitudinally, in the order indicated. They need not go close together. Let dry, trim the edges, and place in the centre of the box as indicated by the dotted lines C C. Have two mahogany knobs with two inches of wire in, tapped about one inch up (these may be purchased at a furnishing ironmonger's for a few pence); pass these through holes at the side of the box into the wooden rod of the drum, and screw up nearly close. These knobs are for the purpose of turning the tinted drum. At D fix a piece of finely ground glass, to form a top to the instrument, which is now complete. To use it place a glass stereo in a stereoscope, stand the latter on the top of the *chromoscope* front of the instrument facing the light, and the reflector b will send the rays through the

tinted drum. These will be dispersed and harmonised on the ground-glass top, and the effect will be really beautiful.

A slight turn of the thumb-screw at the side, and the whole scene changes as if by magic. Moonlight effects are produced, changing again to early morning; the light creeps on, and ere long a succession of tints of lovely hue astonish and charm the beholder. No paint, no daub to partially obliterate the picture, the details of which are preserved in all their purity, and their beauty is enhanced a hundredfold. (40.)

## COSMORAMIC PHOTOGRAPHS.

The following is a mode of applying photography in producing a great effect in cosmoramic pictures:

A large photographic view is coloured on the back in all parts except the sky, which is cut off with a knife. Then the portions of the picture from

which the sky has been detached are fastened by the edges to a piece of glass higher than the view itself. On the other hand, a glass of the same size which has been very finely ground is taken and laid upon the first, and upon the ground surface a sky is coloured with Prussian blue mixed with linseed oil, by means of a pad made of cotton covered with chamois leather. By proper manipulation the glass becomes coated, so as to look like a piece of blue vellum. Care is taken in this operation not to pass over, except by a very trifle, the sky line; then, by simply oiling the rest of the ground-glass, it becomes transparent. When all is dry, these two glasses are placed in a frame having two grooves, distant from each other about one inch, the glass holding the photograph in front, and that with the sky behind. The whole is placed behind a lens of about seven inches in diameter and three-and-a-

quarter feet focal length, and lit from behind. The effect is quite surprising, because, by this arrangement, the sky has a depth and transparency approaching closely to nature. (41.)

## THE ANTHROPHOTOSCOPE.

The management of this interesting apparatus consists in the following:—Photographic portraits are cut free from the background very neatly, and fastened upright on a wheel, which revolves with a background on a different plane (say at an angle of 10 or 12°) from the figure itself. The table is then placed in a box or case. To obtain the proper effect, then, the pictures are viewed through a large magnifying glass of long focus, minute fractions of an inch being converted into apparent distances.

The figures may be variously grouped, and the backgrounds changed at will in the following manner:—A variety of land-

scape views or other scenery is arranged around the marginal portion of a large flat wheel, say two feet in diameter, that part of the wheel being bevelled or sloped back, so as to form an angle of ten or twelve degrees with the general face of the wheel, this bevelled space being, say, four inches wide from the periphery toward the centre. This wheel is placed on a horizontal axis. Close in front of this bevelled wheel another thin wheel, say eight inches less diameter than the first, is placed, but revolving independently around the same axis, the periphery of the smaller wheel just reaching the bevelled portion of the larger. In front of this again other thin wheels, all parallel to the first, are placed, revolving independently of each other, but around the same common axis, each wheel in succession being so much smaller than the one behind it that a line touching their peripheries would make nearly the

same angle with the vertical face of the wheel as the plane of the background on the larger wheel. In the edges or peripheries of these small thin wheels narrow grooves or slits are cut, vertical and parallel to the sides of the wheel, for slipping in and holding the vignetted likeness.

This being the mechanical arrangement, the full-length pictures are attached immediately to the inclined background on the large wheel (being held divergent to its plane by means of wedges), and the vignettes are held in their positions, diverging from the background, by slipping the lower edge into the vertical grooves formed in the edges of the smaller wheels, the relative position and angles of background and likeness being the same as for the stationary pictures. These wheels being suspended inside a box, a large magnifying glass of, say, four inches diameter, and twelve or fourteen

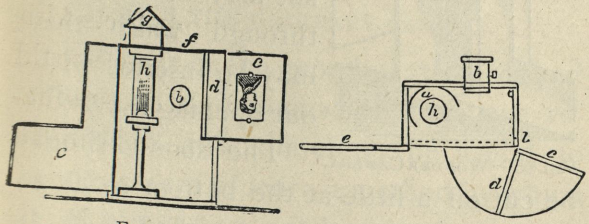
inches focal length, is placed in the front side of the box, opposite that point where the figures become upright in revolving. The light may be admitted through a tinted gass. A movement of either wheel brings different figures in juxtaposition, and a movement of the large wheel backs the picture with a different landscape. To exhibit the most beautiful effects with this mode of arrangement, there should be several of the smaller wheels, graduated down as we approach the front in the proportion before indicated. (42.)

### THE WONDER CAMERA.

The so-called Wonder Camera is intended to show opaque objects upon a screen, much enlarged, and in their original colours. A common card photograph may be shown as large as life without the least coarseness, but as fine as the original. Coloured lithographs of all kinds are very beautiful when enlarged

in this manner. As a means of amusement it far surpasses the magic lantern. An apparatus of this kind may be made in a very simple manner.

It consists of a wooden box with a top made of tin or sheet-iron; the chimney is made of the same material. The lens




FIGS. 64 AND 65.—WONDER CAMERA.
ELEVATION. PLAN.

is the same as used upon a camera for taking photographs. At the back of the box (as will be seen by reference to the elevation and plan, figs. 64 and 65) are two doors placed upon hinges. When the box is in use the door E is kept closed. The other door consists of two parts placed at right angles to one another;

the object of this is to fill the opening in the door E while the pictures are being attached to C; when C is swung into position opposite the lens placed at B, D is carried to one side.

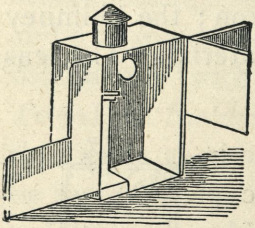


FIG. 66.—WONDER CAMERA.

If stereoscopic views are to be shown, a slit may be cut at E, through which they may be inserted without opening the box. The door E should be cut off a little at the bottom so as to admit air. The light is placed at H, as nearly opposite the picture as possible. It should be a very strong light, lime-light being the best for this purpose. At the back of the light is a piece of tin, bent into the form of a reflector. The light coming from H strikes C, and is reflected through the lens upon the screen. The plan of the box is represented with the top removed.

We give no dimensions, as they will depend upon the focal length of the lens and height of light. Care must be used to have the distance from the lens to C, when closed, equal to the focal length. (43.)

## HOW TO MAKE STEREOSCOPIC PHOTOGRAPHS WITH THE ORDINARY CAMERA.

For some of the experiments described previously stereoscopic pictures are required; it will, therefore, be useful to many readers to learn a method by which it is possible to produce such pictures without the aid of specially constructed stereoscopic cameras.

Mr. Valentine Blanchard described the following simple piece of additional apparatus necessary for the purpose, which can be made by any carpenter. Its size will be determined by the baseboard of the camera. All that has to be remembered in its construction is the fact

that a movement from left to right, or from right to left, of about three inches is necessary. A very light quarter-plate camera may be employed, the base-board of which measures, say, 7½ by 5½ inches. It becomes necessary in this case to get ready a smoothly-planed piece of wood,

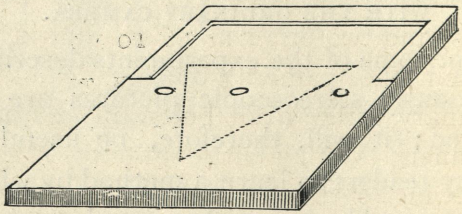


FIG. 67.—ADDITIONAL APPARATUS FOR MAKING PHOTOGRAPHS FOR THE STEREOSCOPE.

9½ by 8 inches. On the front, and partly on two sides, pieces of wood half-an-inch wide are neatly fixed. This furnishes, as will be seen by the diagram, a true edge for the front of the camera, and a boundary on each side for its lateral movement, which will be seen to be exactly three inches, for the inside measurement will

be found to be $7\frac{1}{2}$ by $8\frac{1}{2}$ inches. In the above diagram the wood is not continued entirely along the sides, but wherever possible it is best to continue it quite along, for it furnishes a protection against warping. A hole is placed in the centre for a flat headed screw to attach it to the tripod head, which is shown by dotted lines, and two other holes are marked to attach the camera by means of the ordinary screw from below in the usual manner. With a little practice the unscrewing of the camera, and the rapid movement from right to left, and rescrewing, should only be the occupation of a second or two, for the exact limitation of the camera should bring it in each movement exactly over the hole, and make the attachment of the screw a matter of no trouble whatever. When the camera is in position, the screw is really not necessary, except where trigger shutters are employed, but perhaps it is

better to get into the habit of always using it.

A still more simple plan is suggested by Mr. G. Bernkopf as follows:—

Any tourist's camera may be utilised, such as is in possession of most amateur photographers. Oftentimes a beautiful landscape scene, suitable for the stereoscope, will be offered by the view from the window. In this case the procedure is quite simple. The camera is used without the tripod stand, and placed at the right side of the window; the scene is focussed and exposed, using thereby that side of the double dark slide which has been marked previously with I. The board of the window-sill is now used as a baseboard for the camera, and the latter moved to the left side for about three inches if the objects to be photographed are near, for about four if they are more distant, and for about seventeen inches if they are very distant. Now the second

exposure has to be taken with the side of the dark slide marked with II. It is, of course, not absolutely necessary that the base of the camera be the board of a window-sill—a table in the garden, a bench, etc., will in many cases be of good service. Before development, or when filling the dark slide, the plate I is marked in one corner with R, so that it may be distinguished from the other one, on which the left side exposure has to be taken. The print from such a negative must be cut in half, and the right-hand half mounted on the left-hand of a card, and the left-hand half on the right-hand. Stereograms on glass, which are required for some experiments described in this book, are printed best on the commercial gelatino-chloride plates. Particulars of the process will be found in every hand-book of photography.

# CHAPTER V.

## ENTERTAINMENTS WITH PHOTOGRAPHIC PRINTS

## CHAPTER V.

### LEAF PRINTS.

The production of prints from leaves and ferns and such-like is one of the oldest applications of photography. In England, Fox Talbot, on the 31st of January, 1839, read a paper on "A Method of Photogenic Drawing," in which he described his experiments with chloride of silver, and with the production of images of natural objects, especially botanical specimens. "The production of pictures of lace, leaves and ferns, which" to quote his own language, "it would take the most skilful artist days or weeks of labour to trace or copy, is effected by the boundless powers of natural chemistry in a few seconds." He placed a leaf or engraving on a piece of paper prepared with chloride of silver, and exposed it to the sunlight. The light

darkened the chloride beneath the transparent and white parts of the leaf or engraving, whilst the more opaque parts protected the silver chloride beneath them, and preserved it white.

The illustrations on page 184 and 185 (figs. 68 and 69) are exact reproductions of two leaf prints; they give an idea of the nice effects which may be attained by this mehod, if the operator possesses some skill and taste. The working details of the process are the following:—

The leaves and ferns used for this purpose should not be dried, as the dried leaves do not permit the light to delineate their beautiful and delicate venation. They should be freshly gathered and pressed between the leaves of a book, just enough to extract the excess of moisture, and then used before the delicate veins have become dry and opaque to light.

They are now fastened by mucilage to a thin glass plate, in the form of the

design required. This glass is then placed in a printing frame, and used as a negative from which to print. The sensitive paper placed upon this negative should be exposed to sunlight from ten minutes to half an hour, according to the season and the intensity of the light. The prints are then toned, fixed and mounted as usual.

Great care is necessary in printing not to injure or start off the delicate ferns from the glass. After the print is made a sheet of white letter-paper should always be placed over the ferns, and the printing frame closed again to protect them from injury, and to keep them from drying and coming off the glass.

To facilitate the arrangement of the leaves, etc., the following procedure may be applied :—An outline of the design required is drawn on a piece of white paper, and a reverse of this is taken by putting it with the side on which the


FIG. 68.—LEAF PRINT, REPRODUCED FROM A SILVER PRINT OF THE YEAR 1870.

design has been drawn against a window and tracing it through with a soft lead pencil. Now a piece of ordinary albuminised paper is soaked in a wax solution to render it transparent, and laid on the reverse design, fastening them in their


FIG. 69.—LEAF-PRINT, BY TH. GAFFIELD, OF PHILADELPHIA.

places with tacks or drawing-pins at the top corners. The wax paper is now ready for gluing the ferns or leaves on. Now, seated before a table, you are ready for

your work. A glue-pot just boiling is placed on your right-hand side, the wax paper and design in front, and the leaves and ferns on your left. Select a fern or leaf to suit the design; brush it over with glue, and place it in position. Cover it with a piece of blotting-paper, and press it down with the hand, and so on until you have filled the design. To print, put them in an ordinary printing frame, with sensitive paper, and expose them to light. (46.)

### LEAF VIGNETTES.

A beautiful application of the process described above, for the production of the so-called leaf vignettes, *i.e.*, prints on which the portrait is printed on a leaf or surrounded by a leaf ornament, etc., consists in the following:—

Select a perfect leaf, one free from stains, or holes, or breaks, and carefully trim down all the small branches running

through the leaf to as small a surface as possible. Place the leaf in the printing frame *wrong* or *under* side down. Now the portion or portions of the leaf where the portrait or portraits (a number of portraits may, with care, be printed on one leaf) are to go are to be covered during the printing, in order to prevent an impression upon that part of the paper during the printing of the leaf. This may be done by cutting out a circular or oval piece of black paper, by a compass or otherwise, and pasting on the proper places on the upper side of the leaf. When cutting the black paper, it should be laid on cardboard, in order that the edges of the circle may be smooth and regular. After this is done, place the sensitised paper on the leaf with as much pressure as possible to obtain close contact and sharp detail in the print. After printing we have the leaf impression, with a white circle or oval in the centre,

in which we now print the portrait, by placing the black piece of paper from which the circular piece was taken, over the leaf, and again printing from the portrait negative. Much care must be taken at this stage of the proceedings. Hold the print up to the light, and carefully adjust the black paper so that there will be no white line about the image between it and the leaf print. Very pretty and beautiful effects can thus be obtained, if done carefully.

Another method is the following: Since the suitably arranged flowers or ferns are photographed directly by this method, we may for particulars of the working details which require to be understood refer to the first chapter of this book, where the photographing of flowers is described *in extenso*.

The selected flowers are arranged and mounted on a large sheet of white cardboard, and this is set upon an easel.

The focussing and exposure is done as usual, the only difficulty, after the proper lighting, being the development. In the resulting negative the flowers themselves are not required to be intense, but the centre and the outside edges must necessarily be so, to avoid degrading the whites of the portrait or portraits in the subsequent printing in. This difficulty can only be got over by local intensification after development. This is done by applying one of the well-known solutions (for instance, a saturated solution of chloride of mercury 10 parts, water 100 to 120 parts) by means of a soft brush to the portions to be intensified, carefully removing the solution after some time by means of blotting-paper, and repeating the operation until the portions have become white. In the same manner the ammonia solution (1 : 10 water) is applied, until the portions in question have blackened. Printing is

then done in the same manner as described above, the floral border being printed at first on the sensitised paper, then the portrait or portraits, for which

FIG. 70.—VIGNETTE PHOTOGRAPH WITH FLORAL BORDERS, BY WALTER D. WELFORD.

the ovals or circles in the border have been left free. The two photo-engravings (figs. 70 and 71) are very elegant examples of work done in this direction.

A third method, which gives also very beautiful results, is the following: A


FIG. 71.—PHOTOGRAPHIC PRINT WITH FLORAL BORDER, BY WALTER D. WELFORD.

rough wooden frame, shaped like an Oxford frame, is made, and the face or front covered with virgin cork. To the cork the wreath is attached, either trailing around it or in such other manner as may suit the operator's fancy. This frame is placed against a white background, and the negative made. Printing is done in the manner previously described; the result is a portrait mounted in a pretty and rustic frame. A similar result may be obtained by placing the sitter behind the frame, but the effect is not so good, and it is difficult to obtain so clean a vignette in the centre. (47.)

### ARTIFICIAL SNOW SCENES.

There are a good many different methods by which artificial snow may be produced on negatives, so that the prints taken from them give the impression of snowstorm pictures. One consists in sprinkling vermilion, or any non-actinic

colour, over the negative by means of a toothbrush charged with the pigment. But the results given by this method are not always satisfactory, because the flakes unavoidably appear to have tails. A better is the following method: The negative is coated with a thin sticky layer, which does not dry for some hours; for instance, with mattoleïn (1 part of gum damar and 5 parts of ordinary turpentine). Any suitable dry colour, for instance, lamp-black, is then put in a hair sieve, and the latter held at some distance over the negative. The sieve is then shaken by knocking against it, until sufficient of the colour has fallen flake-like down upon the negative. The plate is then placed in a printing frame, a piece of paper laid over it, and the frame closed. After half an hour the frame is opened again, the surplus colour dusted off, and a proof-print taken from the negative. If it is satisfactory, the negative, in order

to fix the colour upon it, is coated with a varnish which does not dissolve the mattoleïn ; if not, the whole is washed off by means of turpentine, and the operation repeated. (48.)

### PRINTS GIVING A MOONLIGHT EFFECT.

On a former occasion (page 47) we have shown how photographs may be taken by moonlight; an imitation of the same effect may be imparted to photographs taken in daylight, if the following method is used :

A photograph is taken of any suitable landscape in dazzling sunlight, a very short exposure being given, in order to obtain great contrasts, especially deep shadows. In the case of a sea picture the sun and its reflection on the water should be visible when focussing on the focussing glass, and the smallest diaphragm should be used. An exposure of about one-fourth of a second should then

A Moonlight Effect.

be given. It is well to back the gelatine plate with aurine-collodion, in order to prevent halation. Development is done very carefully with an old or diluted developer. The sun and its reflection on the water will come out first, after some time the clouds and the rest of the water will make their appearance. As soon as all the details are visible on the plate, if viewed by reflected light, and the sun with its reflection being quite black by transmitted light, development should be interrupted before the half-tones have acquired vigour if viewed by transmitted light. Printing is done best on green coloured albumen paper very deeply, and the print should be slightly overtoned in the borax toning bath. Even more beautiful effects are obtained with platinum paper. (49.)

PHOTOGRAPHIC PRINTS IN COLOURS.

To produce *red prints*, prepare a solution of

| | |
|---|---|
| Uranium nitrate ... | ... 20 grammes |
| Water ... ... | ... 100 c.c. |

Float a piece of plain (not albumenised) paper 15 to 20 seconds; then dry before a fire, in the dark, expose beneath a negative in the frame from eight to ten minutes in sunlight, or for from one to two hours in the shade. Wash for several seconds in warm water (120° F.), then immerse in a solution of

| | | | |
|---|---|---|---|
| Ferricyanide of potash | ... | | 1 gramme |
| Water | ... | ... | ... 50 c.c. |

In a few minutes the print will acquire a beautiful blood-red colour. Wash in several changes of water until the water remains perfectly colourless, then dry.

To produce a *green print*, take a red print as above described and immerse it for a few minutes in a solution of

| | | | |
|---|---|---|---|
| Nitrate of cobalt | ... | ... | 2 grammes |
| Water | ... | ... | ... 100 c.c. |

Remove without washing, and dry before a fire. It will become green. Fix, by placing for a few seconds in a solution of

| | |
|---|---|
| Sulphate of iron ... ... | 2 grammes |
| Sulphuric acid ... .. | 1 c.c. |
| Water ... .. ... | 50 c.c. |

Wash at once, and dry before a fire.

*Violet prints* are obtained, if a paper is prepared with uranium nitrate, same as for the red print, printed under a negative, washed in hot water and developed in a solution of

| | |
|---|---|
| Chloride of gold .. ... | ½ gramme |
| Water .. .. .. | 100 c.c. |

When the print has acquired a beautiful violet colour, it is washed in several changes of water, and dried.

*Blue prints.*—Prepare paper with a solution of

| | |
|---|---|
| Ferricyanide of potash ... | 20 grammes |
| Water .. ... .. | 100 c.c. |

Dry in the dark ; remove the print from the frame when the shadows have acquired a light blue tint Immerse for a few seconds in a cold saturated solution of bichloride of mercury. Wash once in water ; then place the print in a

cold saturated solution of oxalic acid, heated up to about 100°F. The print is finally washed in three or four changes of water, and dried. (50.)

## COLOURING PHOTOGRAPHS.

An easy method of colouring, which may be applied to carbon transparencies as well as to photographic cards, and which requires very little practice to become proficient in it, has been described by Mr. E. Edwards as follows :

The first thing to be done is to prepare the paints. Get from any wholesale chemist a small quantity of different aniline colours or dyes, and dissolve them separately in spirits of wine, gradually adding the spirit until all is dissolved ; dilute by about its own bulk of water, and add ox-gall until the colours flow smoothly from the camel-hair brush over glazed paper ; when this has been attained, the colours are ready

for use, and the painting may be commenced. It is advisable for the beginner to begin with a portion of the transparency or print which has the smallest surface of the same colour, as it requires a little practice to lay on an even coat on a large surface, such as the sky or the sea. If the colour is piled on by degrees with dilute colour, it renders the laying on of a smoother coat much easier. It is as well to give the transparency a coat of varnish when the colouring is completed and quite dry. For colouring cards, the colours should be laid on very dilute—especially the flesh colour—and should be laid on in successive washes until the desired colour has been attained. The colours most useful are: Lemon-yellow, green, orange, red, blue, and violet.

For flesh colour: Lemon-yellow and red.

For different shades of green: Lemon-yellow and blue.

For lilac and purple : Violet and red.

For jewellery and fair hair : Orange.

The common water-colour brushes give as good an effect as the most expensive ones. (51.)

## COLOURING OF PRINTS ON ARISTO-PAPER.

Prints on aristo (gelatino-chloride) paper are best coloured according to the following method :

The print, which should not be printed too deeply, is treated in the usual manner, thoroughly washed, and may then be either at once squeegeed on a glass or ferrotype plate, or, after drying, again placed in water for a few minutes and mounted.

An *even* glass plate should now be thoroughly cleaned and coated on its surface with any good paste. The print is then removed from the water, allowed to drain, and, with the picture side up, placed on a glass plate. The adhering drops of

the water are removed by means of a soft pad of linen, when the print should also be coated with the paste, and, with its picture side down, transferred to the prepared glass plate; a piece of parchment-paper is then placed over it, and the print squeegeed on in the usual manner. After all the air bubbles have been removed the print is allowed to dry.

After drying the paper on the back of the print is ground off with fine glass-paper until the picture begins to become translucent. The print is then rubbed in with "transparent-medium" (to be had at any stationer's), the grinding being continued, if required, until the desired degree of transparency has been attained. Beautiful effects may be produced by grinding off those parts which, in the finished picture, are to become specially brilliant, down to the gelatine film. After this has been done, the print is rubbed in with "preservative-medium" (to be had

at any stationer's), when the colouring may be commenced at once.

In colouring, the opposite course is taken to that in the case of painting an oil-painting; at first the details are coloured, all the objects being in the front of the picture—for instance, the foreground in the case of a landscape, jewellery, &c., in the case of a portrait. The finer this work is performed, the more beautiful will become the picture. If quick drying oil-colours are used, the larger portions of the picture, the background for instance, may be coloured as soon as the details are finished; but it will be better to wait a few hours, for the reason that the somewhat troublesome work may not be spoiled.

Remember that in this process the picture is coloured throughout on its surface. After the colouring has been finished, another glass plate of equal size is taken, to the edges of which narrow strips of

thin cardboard are pasted, and which is then placed on the coloured picture. The whole is then pasted together by means of strips of gummed paper. The back plate is now painted quite rawly, only the main colours being laid on ; the picture may then be considered as finished. As soon as the colours are rather dry, a piece of white cardboard is placed behind it, the edges being bound up all round by means of strips of paper. (52.)

### IMITATING FADED COPPER ENGRAVINGS.

To photographic prints on salted paper, also to collotypes, photogravures, etc., forming reproductions from old faded copper engravings, etc., an appearance similar to the original picture may be imparted by immersing the print in black coffee. (53.)

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